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THE SOCIAL WORK OF CHRISTIAN
MISSIONS

The Social Work of Christian Missions

By

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CINCINNATI
THE FOREIGN CHRISTIAN MISSIONARY SOCIETY
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PREFACE

THIS volume is designed for those who are interested in the humanitarian phases of Christian missions. The paramount interests of our time are social. Foreign missions furnish an inexhaustible opportunity for social endeavor, and contribute annals in social progress such as are being written in no other field of human endeavor. It is the hope of the author that this volume may be a source of information and inspiration to those who have been aroused by present-day missionary movements among laymen, women, students, and the young people of the Churches. It is especially designed as a help to mission classes in schools and churches. For those classes that desire a short series of studies the introduction, the six chapters, and a review will furnish a division of material; for those who wish a series of lessons extending over a longer period, one or more sections can be used for each assignment. The sources for the work are enumerated in a bibliography at the end of the volume. An especial debt is due Volume III, of Dr. Dennis, great work on "Christian Missions and Social Progress," in the writing of sections 2, 3, and 4 of Chapter

PREFACE

V, and to Dr. Williamson's little volume entitled, "The Healing of the Nations," in sections 3 and 4, in Chapter III, and to Volume VIII, of the Edinburgh Conference Report, in section 3 of Chapter VIII. I am grateful to my colleague, Professor Charles E. Underwood, for assistance in revising the manuscript.

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INTRODUCTION

THE SOCIAL TASK OF MISSIONS

1. THE MISSIONARY AS A SOCIAL FORCE.

Christianity is the religion of humanity. Jesus most often spoke of himself as the Son of Man. In the use of that term he desired to identify himself with humanity. He was God's idea of a man. In his humanity we find one of the divinest factors in revelation. There is little danger that the Church will lose sight of his divinity. It has ever emphasized his oneness with God the Father, but it has not always so emphasized his oneness with men. If we have not a divine Christ we have no Christ, but if we lose the human in Christ, we lose his power to reach the world. The Apostle's great desire for his followers was that they "might rise to the fullness of the stature of manhood which is found in Christ Jesus." To be a perfect man is to be Godlike. It was to that perfection of manliness that Jesus wished to lift the world. And true Christianity goes into the world to create manhood and womanhood. But Christian manhood is never selfish; it "seeks not its own, is not puffed up." Jesus would save the world by making men the saviors of their kind. There is no salvation except through service. The Christian individual is socialized. In-

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dividual power without social conscience is the most dangerous weapon to put into mortal hands. The writer who said it was worth while to fertilize the fields of Europe with the blood of millions if thereby one Napoleon could be created, expressed the very an-tithesis of Christianity.

The socialized individual is the real working factor in the world's uplift. A materialistic evolution may sneer at the missionary and at all benevolence, but a Christian evolution sees in benevolence the most active factor in the civilizing process. When Emerson described civilization in terms of woman's power and influence, he only described it in terms of benevolence, for it is the spirit of altruism that overcomes selfishness and compels man to give womankind their rights. The progress of civilization can be told in terms of altruism and the processes of socialization. Strong individuals may be developed by the "struggle for self," but society advances through the "struggle for others." This "struggle for others" is the law of Christianity. It is the ferment of social service that is leavening the world with good. Christian personality is not that of the "superman," but that of the great-hearted lover of his kind; it has an "enthusiasm of humanity," the power to see the viewpoint of others, to sympathetically enter into their lives and to lift them up. The missionary is the model of Christly aspiration in his faith in humanity's potentiality, and in his self-forgetting determination to lift up the lowest of men.

The Kingdom of God is a new social order. It is a Republic of Humanity, a realization of the life of

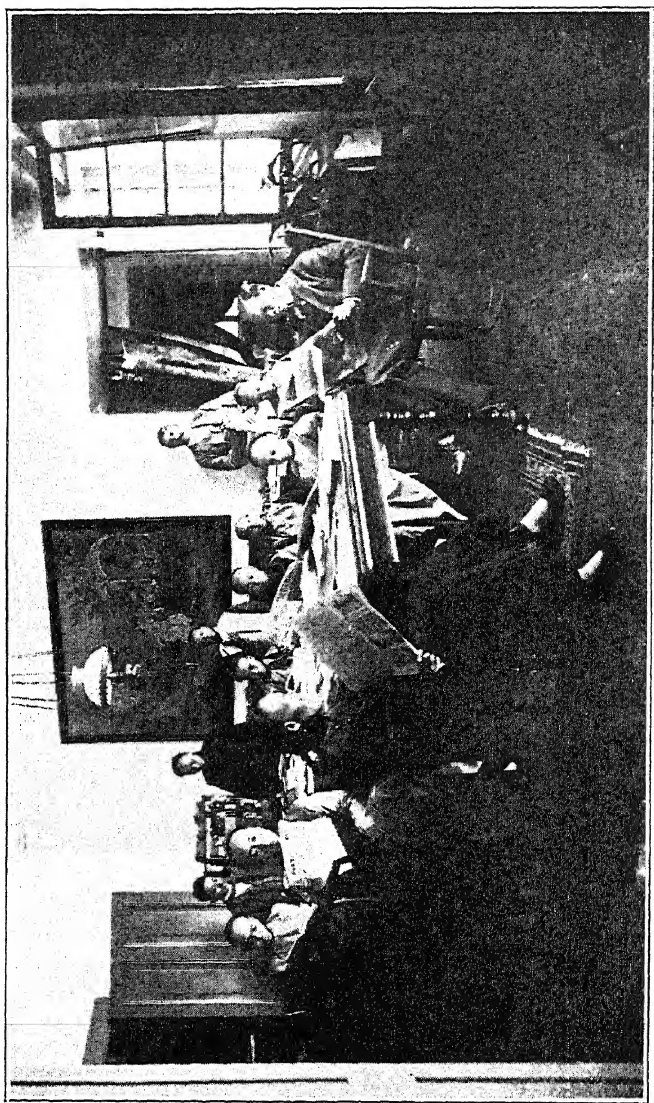
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God in the society of men. Jesus said his mission was "to give life and to give it more abundantly." To give life one must give the things that make life worth while. He can not give life to the slum and leave the slum, nor can he take it to the heathen world and leave the world heathen. Shakespeare said, "He who takes the prop to my house takes my house." The goods of life are its "props." A man's life does not consist in the abundance of the things he possesses, but his possessions in terms of habit, custom, ideas, homes, friends, environment, and ideals are so much a part of him that the worth of the lives of men are largely measured by the value of such possessions. The Kingdom of God is to be rooted into the earth. [The task of Christ was to save the world, not merely to save a few out of the world.] The "kingdoms of this world are to become those of our Lord and his Christ." He would save commerce to honesty and a true social service; politics to purity and as the chief bond of communities in their fraternal life; religion to human service and as the strongest factor for binding the peoples of the earth together. The Kingdom of God is to include all nations and peoples in a social bond that will put an end to strife and bloodshed, and bring peace to all the earth. It is to so reorder human relationship that all men will be privileged to dwell in a democracy of right, where there will be no tyranny, no expropriation of the things of another, no class privilege, and no deprivation of opportunity to him who is worthy. Its ideal may be millenniums away, but vast strides have already been made toward it, and if one has faith in the eternal purpose and might, he can not

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doubt the final issue. But men are "to be workers together with God," in bringing these things to pass.

A theological Christianity has failed to save the world. The saving power of Christianity has ever been its interest in men and its faith that the fact of Christ, once planted in their hearts, would accomplish the task. We must have a theology. It is only a systematic statement of our knowledge and theory of divine things. But sociological Christianity is our knowledge and theory at work. Henry D. Lloyd called it "organized friendliness." In the middle ages it was thought an acceptance of the creed was sufficient unto salvation. Peoples were given the choice of the dogma or the sword. St. Olaf went through Scandinavia, singing psalms and coercing by the sword, until he had "Christianized" the land. Charlemagne sent priest and soldier together, and our Anglo-Saxon forefathers accepted death by the thousands rather than take that kind of "salvation." Great bishops used the pomp and awe of ceremonial, and lured with promises of escape from torment by mere submission to baptism and an abandonment of the idols. St. Xavier sprinkled drops of water on the heads of multitudes in Goa and reported tens of thousands of conversions; ringing his bell, he would call the crowds together, and the simple message, "be baptized and you are saved," found little opposition; but he left no better life behind him. Charlemagne established churches and schools, and lifted up the converted masses somewhat, but his converts were mostly "baptized pagans," and Europe was Christian in name only. The same story is written in the history of Latin



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America. It is yet starkly heathen for the most part. There was no social message; Christianity did not mean the implanting of new ideals of society. It is in its social message that Christianity outruns the other missionary religions in its permanent power to uplift, and in the measure that it has implanted social principles, has its missionary message taken the rootage among a people that brought permanent success. It becomes a civilizer through its implanting of humane principles and social ideals in the hearts of its converts, and they leaven the whole of the life about them. Immediate conversion is not always the means of doing the best work. The planting of the Kingdom of God may be slow, but it will, in the end, bring forth its fruitage in the greater abundance if it is securely planted. No true missionary despises numbers, neither does he count names on the church roll his success; his gauge of success is that of regenerate lives and the building up of a community of regenerate folk, with all the endowments of modern Christian civilization. A civilization can not be lifted by speculation or by a syllogism, and it was never lifted by a legend. It is not our theories about Christ, but our implanting of the life of Christ, with all it means to our civilization in higher ideals, purer thinking, better homes, greater equality, more value on life as such, a higher standard of living, and more of the spirit of service, that brings the world to him. When we "take chemists for our cooks, and mineralogists for our masons," we will put our dependence in a theological Christianity to save the world. "The old creeds are not fitted to harmonize with the intellectual, social, and moral

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power of the modern world," says Mr. T. E. Slater, of India.

'The new-born society of the missionary community means problems in dress reform, in housing, in hygiene and sanitation, in education and the art of healing, in more democratic relationships, a new family order, in the readjustment of the place of womankind in society and the home, and, in time, in railroad building, international commerce, diplomacy, and all those arts of social intercourse that characterize civilization at its highest. Through these arts of socialization and civilization the missionary confers upon all the society about his Christian community the social blessings of his gospel. He thus lifts all into a more proximate relationship to his gospel, and shortens the step they must take in order to come into the Kingdom. Then he may hope for true "mass conversions." Most men move with the crowd; they think and act together. When all custom and thought is lifted near the Christian level, multitudes find it possible to join the Christian host.

2. THE SOCIAL WORK OF THE MISSIONARY.

The missionary is the pioneer of all progress among the nations to which he goes. Following the method of his Master, he goes to change the hearts of individuals, and when he has changed their hearts he has so changed their attitude toward all life that he has inaugurated a new era in their midst. The change he makes in them is such that all better things are a part of their future quest.

The social question is simply the question of the

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other fellow. Its final solution rests in the Golden Rule and the caring for things of others as if they were our own. Heathenism cares little for the other fellow. It has no charity worthy the name; it knows little of self-control in appetite, temper, or ambition; its gods are selfish, and its passions are intemperate; its conceit is monumental and commensurate only with its ignorance; each seeks that which is his own, and the fates may take the hindmost. There is little social welfare attempted by paganism; Christianity alone rests upon social service.

Like his Master, the missionary goes to give a more abundant life. He creates within man a desire for the larger things, and so adds to their lives that living becomes a new thing to them. It has been said that when a savage is converted, he immediately wants a stool, a suit of clothes, and a book. The first is the symbol of all those implements of domestic art that make for home and domestic comfort; the second stands for decency, courtesy, and virtue; the last is the beginning of education.

Let it be here said that the missionary does not go to impose an American type of architecture or tailoring, nor to make any peculiar Western custom of living the distinctive type of the new manner of life. He is not sent to Anglicize or Occidentalize, but to create a new heart and to reorder native customs according to the dictates of cleanliness, both within and without. When he has created the new creature, he needs but to lead him in the cleansing and repair of his ancient habits of life, and a rebuilding according to the environment in which his lot is cast, and by the

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best use of the material that fortune has placed at his hand. It is not the missionary's part to change racial customs, except where they are hurtful. He is there to build up a nationalism, and create a patriotism that is peculiar to the people to whom he has gone. It is not his task to plant a foreign flag, nor is he the emissary of commerce, though his work opens the pathway for the trade of all industrial peoples.

The new aspiration is the beginning of all things new. Bishop Colenso was a brilliant and benevolent man. He reasoned, however, that as in religion is the quintessence of human attainment and refinement, it could be best taught after a barbarous people had learned some of the arts of civilization and been brought by education to a state where they could appreciate the high things of the spirit. He accordingly went to the Zulus with industrial schools, and offered them better houses to dwell in. They looked on with awe, but did not see why they should adopt the white man's house or implements, and made little attempt to imitate. Two humble and unlearned Dutch missionaries had founded a mission a day's journey away, in the simple faith that if they could create a new heart in the black man, all these other things could be added. They taught heart and hand together. After some years of effort, Colenso rode across to their mission one day, and throwing a bag of fifty golden sovereigns on the office table, said, "You have won." Samuel Marsden tried to put the material arts of civilization first in New Zealand and, after twenty years of trial, confessed his error in method; within a single generation the whole people were transformed by putting

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first things first and creating a new life within the savage Maori breast. When Christianity had found lodgment in the heart of the savage Africander, he nursed his benefactor, Robert Moffat, with the tenderness of a woman. The French gave the Arabs stone cabins, and the proud, old sheik thanked them for so excellent a shelter for his sheep. The Canadians built cedar huts for the Chippewas of the Northwest, and they herded their dogs in them, while they held to the immemorial custom of freezing in wigwams. The missionary went to both, and by creating a new desire, taught them to build their own houses. Wherever he goes, the nomads build fixed habitations, the warlike become tillers of the soil, the piratical learn the arts of industry, and the slave-holding come to honor labor.

Buckle lays it down as an axiom in the philosophy of history, that progress comes from within—it can not be conferred as a gift, it must be won out of a desire that will fit for its attainment. It is for that reason that men, who, like Sir Andrew Frasier, have been colonial administrators for thirty years, testify that Christian missionaries do more than all the power of an empire can do to regenerate a nation.

No more effective testimony to the social benefits of Christian missions could be given than the contrast between two villages—the one heathen and the other Christian. In the heathen village the garbage is in the street, the houses are in a more or less tumble-down condition, the roofs are awry and full of leaks, the children run naked, the women are in rags, dirt is omnipresent, vice is written on most of the counte-

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nances, hoplessness overcasts the faces of the many, and absurd custom, with its counterpart of superstition, is everywhere rife. In the Christian village the house may be no larger, but it will be clean; the toil may be little more remunerative, but it will be more persistent; the children will be clothed, and the women neat in native garments; the village street no longer reeks with filth, and an angle of uprightness has seized upon things; faces take on a new light, hope is in every countenance, and superstition has given place to an enlightenment that is in striking contrast to the old manner of living and doing. The ribaldry of heathen song has given over to the quiet of Christian cheer, the riot of heathen sport has surrendered to the orderliness of Christian pleasure, and in place of the vile rites of superstition comes an enlightenment wherein instruction in righteousness and temperance is made to worship God.

The missionary's home is a social settlement in the midst of a pagan community. There he exemplifies the improvements that civilization offers to humble natives, and shows forth the heart of it in the art of Christian living. There woman is honored and children accorded rights that heathenism has never recognized. On these two facts the arch of civilization's triumph is founded, and the key of it is Christian love.

The missionary translates books on every theme that relates to human welfare, and opens a new world to the astonished eyes of ancient half-civilizations. He inaugurates philanthropy and heals the bodies of the sick and provides for the lives of the abandoned and teaches the blessed art of caring for one another. The

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old barbaric heartlessness is supplanted by a touch of mercy, and self-immolation and mutilation give way to deeds of fellow-help. He plants schools and is to-day actually instructing more than a million and a half of the youth of pagan lands. From these come the makers of to-morrow in every heathen nation. Through his institutions of learning in China, the whole empire has changed immemorial customs of instruction. Verbeck taught the makers of the new Japan and founded the Imperial University in Tokio. The industrial schools at Lovedale and Blantyre have been multiplied into hundreds, and from each goes forth a roll of men with new hearts, trained minds, and skilled hands, ready for the practical work of starting civilization. Education and philanthropy become the web upon which Christianity, by the hands of the missionary, weaves the woof of a nation's life into a new fabric. He is the only foreigner there with no exploiting aim, but only to do the people good. For a time he may not be comprehended, and may often have to suffer for the judgment others have begotten in the native mind for all men of his color, but in the end he is understood and multitudes arise to call him blessed.

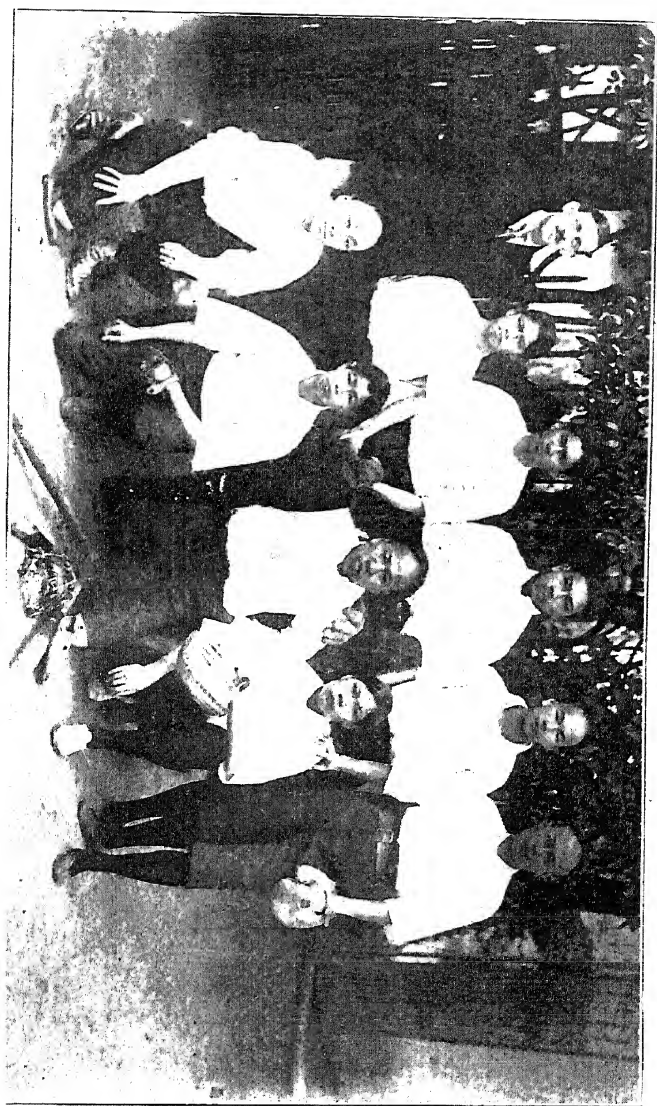
Missionaries have done more than evangelize, translate books, found schools and hospitals, teach industry, and preach the gospel by a model home life and a character that is upright. They have advised governments regarding important innovations making for progress and peace. They have added to earning power by invention, and have introduced revolutionary ideas in commerce and agriculture.

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They have overcome hurtful customs in the name of comfort and humanity, and opened new avenues for adding to the material welfare of the people. They have taught native races the value of untouched resources and the waste of uneconomic habits. There has been no boon that could be given that they have not given, and in their delivery of a religious message they have ever counted that any gift made to the intelligence, comfort, cleanliness, neighborliness, earning capacity, or any other means of social welfare, was a part of their work and an honor to their Master, who went about doing good.

Heathenism has never valued life highly for its own sake. For that reason suicide has been easy, and the murder of infants frightful. Christian missions puts life in the scale of values and finds it of supreme worth. The missionary has gone where cannibalism was openly practiced and has abolished it; slavery has yielded to his persuasion on a hundred mission fields; infanticide has become a crime wherever his hold has been established; woman has been raised from the position of a chattel to that of a companion to man in the ratio that his message has been adopted, and woman owes more to the missionary than to any other active factor in the world of affairs. Customs that have been a torture to the flesh and signs of subservience have been abolished, worship has been turned from the insanities of mutilation and ascetic denial to the sweet reasonableness of praise and prayer and the help of fellow-man.

Suspicion is a species of social paralysis in heathendom. Where there is no fellow-trust there can be no



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fraternal bond. Trade is not conducted there in trust, but in distrust; it is not so much the normal means of building up the economic life as it is a subterfuge for preying upon your kind; it is a species of knavery under a flag of truce, so to speak, for it is a battle of wits and a warfare of deceit. Government is for the sake of those who have the power rather than for the sake of the governed, and "justice is sold for a bribe and the poor for a pair of shoes." Few men trust their neighbors, and every man is regarded as a rogue. The missionary establishes the virtue of fellow-trust in his convert and makes him a man worthy of trust. Upon this virtue the solid fabric of a better order of society is builded, and from the ranks of the missionary's pupils governments and commercial houses select men for their trustworthy agents. The growth of the Christian community in the midst of a native population strengthens the bonds of credit and proves by degrees that honesty is the best policy. Administration in the hands of native Christians gives the subjects of law a taste of integrity in government, and raises the demand for the same uprightness among all officials.

Certain philosophers of history once urged the theory of the hero as the creator of progress. To-day we have a revision of that theory in favor of the group, who in the midst of mankind become a leaven of new ideas and better customs, and from whom arise the leaders and the teachers of a better day. They think out better ways in an interchange of ideas and exemplify their ideals in their own manner of living and doing. This is democracy's revision of the monarchical

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theory of the hero. This is the process of the missionary evangel in its social work. Christian missions create a new manner of life among groups of natives and they become a leaven in the whole lump, illustrating to their fellows the benefits of the new way of living. From these groups flow out streams of influence that redeem the whole land in the course of time, and bring multitudes to accept the creed of civilization.

To raise the standard of life among a people is civilization's finest achievement. It is one of the most patent of the results of the missionary propaganda. To add to the life of a whole nation by making the daily lives of all its people somewhat more worth while, is, by that much, to bring nearer the Kingdom of Heaven. To level the inequalities even a little, and to bestow the gifts of mercy, justice, and humility upon the ideals of a nation, is to do the work of Him who came to make all men brethren. Christian missions proceed by creating this man and that a new creature—not to save them out of the world, but within it and for its sake. They live the new and better way and a great multitude come to appreciate it. The passion of fellow-help is implanted, and each does something for the other. The leaven of human good is spread far and wide, the spirit of social service creates a new and better order of society, and the Christ, thus lifted up, draws all men unto himself.

The figures that tell the number of converts, inspiring as they are, tell but a part of the story of the boon of good the missionary evangel carries unto the uttermost parts of the earth. They are really but an

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index to the mighty volume of good the missionary is doing. "Teaching them to observe all things, whatsoever I have commanded you," he creates a new order of society.

3. CHRISTIANITY AS THE UNIVERSAL FAITH.

All nations have possessed a national religion. Old Roman statesmen were personally filled with contempt for the gods, but held to them because they deemed them means of holding the people in reverence and an aid to order. They did not dream of a state without religion. Modern Japan illustrates the same national intuition. Shintoism is the religion of patriotism. The worship of the emperor comes down from primitive legends that trace the birth of the dynasty to the gods. Roman Christianity was thrust out of Japan because it was thought to be interfering with the emperor's divinity, and that its fealty to the pope would divide the loyalty of the people. Confucianism is Chinese. It is nationalistic in its claim to their fealty. The emperor is its supreme head. It has spread to other Mongolians as an ethical creed, but China has exalted Confucius to divine honors and requires all officers and all students at governmental schools to pay him religious reverence. Brahmanism is Hindu. It has never spread beyond the borders of India, and has no desire to do so. Buddhism has become largely Mongolian. Burmah and Ceylon are about the only non-Mongolian peoples who make it their faith. It was once a missionary faith and its early annals furnish heroic examples of missionary zeal, but it had not the vital social power to keep it

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to the task. Its contact with Christianity has aroused a small revival among Japanese Buddhists, and they are adopting elements of the Christian gospel in an effort to overcome its inroads. It to-day has fewer adherents than has Protestantism, numbering, according to late authority, only 184,000,000, though it has been living 2,500 years amid great populations. Mohammedanism is essentially Arabic. It is a missionary religion, but centers in Arabic nations and among the descendants of Arabs, and has ever been as much political as religious. The great Moslem population of India is traceable to the Arabic invasions of centuries ago, and its adherents are largely their descendants, mixed, it is true, with the less virile Hindu blood. The same is true of the faith of China.

The missionary sterility of all these religions is due to a lack of social force. A faith spreads in the ratio that it gives men an interest in fellow-men, and inspires them with the spirit of service. When a religion is frankly nationalistic, there is no missionary appeal. Unless it puts great value upon life as such, and assesses the world in which we live at divine values, there will be little missionary enthusiasm. Confucianism makes every man sufficient unto himself. It allows concubinage, and thus the degradation of womankind. Slavery is practiced and suicide is very common. The criminal code of China has ever been barbarous, and there has never been either universal education or a charity worth the name. The great sage said, "Thou shalt love thy friend and ignore thy enemy," and added, "Have no friends not your equal." His version of the golden rule made it a negation.

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The ethical code of Confucius is a great gain over that of nature religion or of Hinduism, but it lacks the propulsive power of faith in God and a universal interest in man. It ignores the Creator and teaches that the less said about him the better. Buddhism began in benevolence, but is to-day existing with no charity beyond the giving of small alms in order to acquire merit. Its monks are lazy and generally ignorant, though among them are found some who are in earnest and seek the light. But Buddhism crushes desire as bad and turns its true disciples from the world as from a place of evil. It has made little real contribution to progress, and its hope for life is that it may end in extinction. Brahmanism is a caste religion. That within itself is sufficient social condemnation. Mohammedanism has been the most virile of non-Christian missionary religions, but its propaganda has been by fire and sword and thus by anti-social force. It teaches polygamy and concubinage, and practices slavery. It makes of its followers a superior caste wherever they dwell, and comes to all other faiths with fierce intolerance. Its fatalistic theology must destroy its missionary force whenever it is separated from political aims. Its missionary crusades have ever been political and never humanitarian.

Christianity is the great universal religion. It has been misused by half-converted adherents for every end that human desire might conceive. There are yet those among them who would make it racial, and deny that it has any efficacy among others than the whites. They have accepted it from Asia, and from alien hands, then deny that it is fit for either Asia or

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aliens. It has proven what its founder intended it to be—the greatest social force in the world. It proclaimed that life was valuable for its own sake. When Jesus asked, “Of how much more value is a man than a sheep?” he challenged the world’s pagan view of the value of humanity. Man is never to be considered property nor made subservient to property rights. When he called the body the temple of the spirit, he laid a sacred value on the flesh and taught none to despise the world. His call to service was a heroic demand for complete self-forgetfulness, not to avoid the world and its frictions and temptations, but to grapple with evil boldly and valiantly to overcome it. When the Apostle Paul said there was neither Jew nor Greek, bond nor free, male nor female, in Christ, he propounded the essential democracy of Christianity; in the first he abolished all racial and nationalistic aversions; in the second he condemned all class distinctions; in the third he raised woman to a level with man and destroyed the age long, universal, anti-social, discrimination against her. Christianity is a dynamic of all just action. The institutions of civilization are its enginery, but its religion is its dynamic, its propelling force. Gov. Woodrow Wilson defines Christianity as the center of education, philanthropy, science, politics, philosophy, and, “in short, the center of all sentient and thinking life.”

The manner in which it makes good in its missionary propaganda is twofold; it wins great numbers of individuals and creates them social factors for the uplift of their kind; and it leavens the social and moral life of whole populations that it has not yet won to

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membership in its churches. As illustration of this latter, Japan furnishes a brilliant example. A Japanese Buddhist, a physician, says, "Christian morals have won in Japan." Dr. Nitobe, author of *Bushido*, says, "Christianity alone is powerful enough to overcome the materialism and utilitarianism of Japan." A Japanese Buddhist priest said, "Christian ethics are the best in the world." A Buddhist professor of ethics says, "Japan must accept Christian ethics." Professor Murakami, Japan's greatest Buddhist scholar, acknowledges the moral superiority of Christianity. Baron Mayajima says: "No matter how large our army and our navy, if we do not build upon righteousness we shall fail. The religion of Christ is the one most full of strength for the nation and for the individual." Prince Ito, within the last few years, said: "The only true civilization rests on Christian principles. The young men who receive Christian education will be the main factors in the future development of Japan." Count Okuma said to a body of young Christians, "Live and preach this (the Christian life), and you will supply just what the nation most needs at this juncture." The Japanese Minister of Education recommended the New Testament as the first book for all young men to read. A volume of such statements might be compiled from the leading minds of all lands. The religion of the Nazarene knows no national lines; its principles are universal, they touch all humanity where it is at one, and in time will lift all humanity to that oneness which will banish "man's inhumanity to man," for "the spirit of Christ is the spirit of Humanity." It binds to no dead past, as

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does Confucianism, but builds solidly upon the past; it forgets not the world to find God, as does Brahmanism, but finds God in his world; it loses not God to find the good of mortal life, as does Buddhism, but gauges the good of mortal life by his divine life; it conquers not by a sword of blood, as does Mohammedanism, but by the sword of the Spirit and the bonds of peace. It would make all men brethren, still all hate, break down all sectism and class discord, and rule the world through the constructive power of a universal love.

Religion is the mightiest of all forces resident in humanity. Men die for their faith when they would for nothing else, and their lives are controlled by it against all the powers of being. "Man is incurably religious," said Paul Sabbatier. Spencer failed utterly to find the non-religious man his theories hypothesized, and Ratzel, in his "History of Mankind," affirms that there is no such thing as a non-religious human being. Even the skeptical, in their very aversion to religion, display "incurably religious" interests. Christianity rises to its highest in its hold upon the fealty of its followers. Moslems may die in fanatical zeal, but "the power of the love of Christ has been displayed alike in the most heroic pages of Christian martyrdom, in the most pathetic pages of Christian resignation, in the tenderest pages of Christian charity," says Lecky. The power of Christianity as a civilizing force is manifesting itself in these latter days as never before, because its followers are moved to-day with a better understanding of the genius of their faith. Their conquest is by the subtle

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art of persuasion. That art has ever been like the warming rays of the sunshine in its power to fructify life. Like the acorn that bursts the rock, Christian lives rend the Gibaltars of heathenism. Æsop's fable told how the sun took the coat off the traveler's back when the violence of the wind only made him hold it the more closely. "The Apostle Paul's journeys outrivaled in significance to civilization the conquests of Alexander and Cæsar," says Prof. William Ramsey. "The missionary has done more for the Levant than all the nations of the earth together," said Gladstone. "Bulgaria would never have gained her independence had it not been for Roberts College," mourned the late Sultan Abdul Hamid. "Not England, but Jesus Christ is redeeming India," says Sir Andrew Frasier, for thirty years an administrator in India. "England has sent out a tremendous moral force in the life and character of that mighty prophet to conquer and hold this vast empire. None but Jesus, none but Jesus, ever deserved this bright, this precious diadem, and Jesus shall have it," cried Keshub Chunder Sen, founder of the Brahmo Somaj, in an eloquent peroration to an address he delivered in Calcutta. Religion is the mightiest social power resident in humanity, and the Christian religion is the mightiest power for the constructive uplift of mankind that has ever entered the world.

CHAPTER I

Things Figures Can Not Tell

1. BY THEIR FRUITS YE SHALL KNOW THEM.

"History is no sphinx." Wendell Philipps asked students of comparative civilization to allow China to speak for Confucianism, Japan for Buddhism, India for Brahmanism, Turkey for Mohammedanism, and America for Christianity.

The final test of a culture, a civilization, or a religion is the progress it creates. Every great religion produces a civilization, and every civilization has a religion at its core. Christianity creates personality; it appeals to the individual; then it socializes him. Christian personality is not measured in terms of selfish self, but in the terms of unselfish self. It vaunts not itself, is not puffed up, seeketh not its own. The greatest personality is that which most adequately sees the viewpoint of all its fellows and most ardently sympathizes with all mankind, and then adds a mastery of those events that may be ordered for the common welfare of all.

"Religion works most fruitfully through the social organism," said Dr. Storrs. It makes good in social terms. History reveals that it is not in material things, but in moral character and social good that civilization finds its guarantee of stability. Good

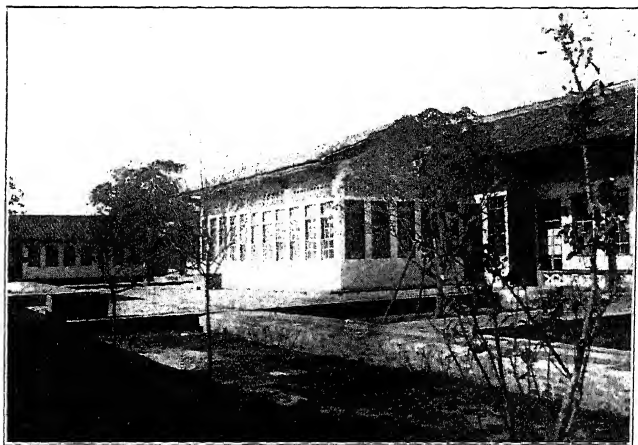
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becomes the "goods" of civilization. Economics are selfish. Property rights, when made the paramount consideration, bias the minds of men to things rather than to human good; competitor is arrayed against competitor, class against class, and nation against nation. Human welfare demands co-operation. Christianity creates high social ideals and gives men the will to realize them. A religion is powerful to the extent that it interests men in men, and gives them the working means of advancing the welfare of their kind.

Christianity courts the tests of comparison as a ministrant of social good and an inspirer of social progress. Lowell defied the skeptics "to point to any spot ten miles square, where a decent man could live in decency, supporting and educating his children, where age is revered, infancy protected, manhood respected, womanhood honored, and human life held in due regard, where the gospel of Christ has not gone and cleared the way and made decency and society respectable." Frederic Dennison Maurice said, "Every one is sensible of a change in the whole climate of thought and feeling the moment he crosses the boundary which divides Christianity from Heathendom." Christianity alone is flexible enough to meet the demands made by human progress. It creates in man a desire for better things, and gives him the open mind and makes him a "seeker after truth," promising that in that truth he shall find the freedom that all souls seek. Not all Christians keep the open mind, but they do keep it in just so far as they are Christians. And it is not merely a wearing of the name Christian, nor



Old Examination Stalls at Nankin, China. Modern Civil Service is now replacing the old-time examination in Classics.



A Modern School on the site of the Old Examination Stalls at Chentu, West China. This illustrates the New Era in China.

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the fact that one has appropriated part of the benefits of Christianity that gives the world a helper. Open-mindedness and truth seeking are necessary conditions of Christian progress.

Paganism is static; its Golden Ages are in the past. Christianity puts its Golden Age in the future. The Kingdom of God has not yet reached its consummation, it is *to come*. Pagan religions give men the backward look. Christianity gives them the forward look. Men are optimistic because they believe their age has made progress over previous ages. Paganism is pessimistic because it believes the present is worse than the past, and therefore the future will perhaps be yet worse. Paganism hopes to escape this world, to retire into oblivion, or to be rescued into a better place. Some Christians have adulterated their religious doctrines with these ideas, but at the heart of Christendom has ever been found a saving faith in the promises of Scripture for a "new heaven and new earth."

China is the answer to Confucianism. Confucius pretended to give nothing new; he pointed back to the sages that were old, even in his time. He gave China the finest ethical code found outside the Christian Scriptures. But the Celestial Empire has made no progress in a millennium. Hers has been the backward look. She worships her ancestors. All things were done as the fathers did them. The ethical code of Confucius's five relations lifted her as high as ethical precept could lift a great people. Then, notwithstanding the fact that the Chinese are among the most virile, industrious, intellectual, and peaceable of

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peoples, China crystalized and progress ceased. The ethics of Confucius is negative. It lacks a propulsive power for social good. Confucianism solidifies, Christianity fructifies.

Japan is the answer to Buddhism. The religion of Gautama is the most spiritual outside of Christianity. The great Buddha was himself one of the first of saints. Yet to-day Buddhism is represented by a priesthood whose character is, to say the least, not synonymous with charity or virtue, and with a worship that does not imply any fundamental social obligation. Christianity has brought more progress to Japan in fifty years than Buddhism brought in five hundred years. "Buddhism is a personal philosophy rather than a social power," says Dr. Carver. Japan's social life remained licentious, her daughters were sold into shame, woman was not a companion to her husband, and despotism ruled in all her life, from the family to the throne. It was not until Christian ideals entered Japan and she opened her eyes to the arts and powers of Christian progress, that she threw off the provincial customs of ages and entered the list of modern nations.

India is the answer to Brahmanism. A Greek traveler and historian of twenty-five hundred years ago draws a picture of Hindu social life that agrees with their own traditions of better days in the past. According to his account there was then no caste, and the customs were less cruel than they were when the first missionaries arrived, two centuries ago. Buddhism came before that ancient date and sought to lift India out of a semi-animistic faith to a higher

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realm of philosophy and of religious meditation. But Brahmanism overcame the purer teaching, and there is every evidence that it has been a degenerating, rather than a regenerating religion. Caste paralyzes all power for social progress, because there can be no real progress without the enlarging of democratic ideals and the realization of a larger amount of social equality. Woman is in a more abject state in India than in any land outside of savagery. Their worship is conducted with debasing practices and through forms that testify to degeneracy of ideals. India has kept no annals except such as her religious traditions have preserved. Her dominating religion, which should have been her social force, has been more nearly anti-social. Instead of uniting the nation, it has tended to disintegrate it. It has had no positive evangel. It has been eclectic, and adopted and absorbed and then debased almost every better religion or philosophy proposed in that benighted land. If it was said of China that she was not a country but a race, it could be said of India that she was not even a race, but a heterogenous collection of peoples, fenced in by the giant Himalayas, curiously cultivating at one extreme a speculative metaphysic, and at the other slowly losing vitality through anti-social customs.

Turkey is the answer to Mohammedanism. The faith of Islam was created out of a degenerate Judaism and some stray snatches of early Christianity, and then adapted to the life of Arabs. It took on the military spirit and became missionary through desire of conquest. It has a legalistic moral code, a sensual promise for the hereafter, a strong, prejudicial sect

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spirit, and an unelastic social ideal. It has no caste, but it is a caste within itself. Its legalism prevents it becoming a leaven for moral welfare, for legalism does not have power to create real character, not even a Christian legalism. It is fatalistic, and therefore deprived of the dynamics of progress, even though it had the moral power that high principles would give. The answer of history to Moslemism is the contradiction of a medieval nation in close contact with the world currents of progress, and yet denying ingress to their fructifying tides. Turkey is to-day apparently turning to modern ways, but she is doing so at the cost of her historic religious position. The Sheik-ul-Islam is repealing her sacred traditions and denuding her of her battle-cries, and proclaiming the hated "infidel" and "Christian dog" a brother. The young Turks are men who received their education in a Christian atmosphere. Christian missions set the models for Turkey's proposed school system, and cultivated the minds of so many of the youth that when rebellion broke over the ramparts of tyranny there were none to defend the old regime, and the land was leavened with enough of a citizenship to make a modern government an immediate and practicable reality. Islam created no school system, but it did create a harem. It brought no gospel of peace, but boldly practiced one of conversion or extermination. It did not open, but defiantly closed and prejudiced minds. It plead a form of equality for the "faithful" and thus improved Hinduism, but it plead for intolerance toward all not of its creed, and it evolved no system of benevolence, founded no real homes,

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instilled no ideals of justice or mercy or a humble walk with God. Its social power is not more than equal to its inculcation of those practices which Christianity teaches, and its denial of progress is to be discovered in those anti-social principles, through the practice of which it fails to reach up to the lofty ideals of Christianity.

The world to which Jesus came was no more moral, democratic, human, or charitable than is that to which his gospel is carried to-day by the missionary. How do we account for the difference between that world and the one which professes Christianity to-day? Christian civilization alone, among the civilizations of the world, has made great progress and seems to be even yet only in the childhood of its growth. It is not yet perfected, but its glory is that it is ever going on toward perfection. A thing is to be judged, not by its immature attainments, but by the promise it gives of fruitage and by the fruit it has already borne. There are many good things in the pagan world and there are many bad in Christendom, but the comparison is not in a confusing process of selecting the best and the worst, but in an averaging of the totals.

Our modern Christian civilization testifies eloquently to the success of Christianity as a civilizer. Our forefathers had been barbarians from time immemorial until Christianity was brought to them. From that time the evolution of modern Anglo-Saxon and Teutonic civilization began. To challenge the missionary is to deny the very courses of history. We have not yet purged ourselves of all our pagan heritage. We have a great deal of baptized paganism

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in our churches. There is a great deal of counterfeit afloat, but its existence only evidences the value of the genuine. Christianity alone, among the great religions, has created benevolence and brotherly love and impressed them upon whole nations as ideals of life. It alone has created that type of personality which expresses itself in fellow-service. It alone expresses sacrifice in social terms, and makes religion a thing of service to fellow-man. It stands the test of the "average good."

2. THE STORY OF THE FIGURES.

Statistics are usually considered dry, but let it be a column of digits that sums up our profits or tells the totals of a fortune that has come to us, and we are aroused to a feverish enthusiasm. Figures that indicate a remarkable missionary advance ought to be very interesting to Christians, because they tell of new recruits to the cause, and much more, they tell of conquests that mean permanent territory added to Christian lands, and are eloquent with the romance of missionary adventure and the tragedy of missionary sacrifice.

There are a few critics yet that scoff at the missionary enterprise, but their ignorance is so coming to shame them that their dolorous and caustic voices are not often heard. No one but an intellectual provincial, a moral agnostic, a medieval race-hater, or a dogmatic religious quack could be cynical about an enterprise that brings so much of human good and shows such an amazing success as does the missionary enterprise. Every present-day Christian people have

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abandoned an ethnic faith to accept Christianity, and the marvelous success of this first century of modern missionary activity gives assurance that every people with an ethnic faith will ultimately abandon it in favor of Christianity. It was a Jew that brought the gospel to Rome, a Roman that took it to France, a Frenchman that took it to Scandinavia, a Scotchman that evangelized Ireland, and an Irishman that, in turn, made the missionary conquest of Scotland. No people have received Christianity except at the hands of an alien, and it is at the hands of aliens who have been bereft of provincial conceit and filled with Christ-like confidence in men, without regard to race, color, or kind, that it is being taken to practically every land under the sun to-day. There is a patriotism of the Kingdom of God, and a fealty to the interests of humanity that makes a man none the less loyal to his own people, but fills him with a larger love for all the world.

The first million converts of the modern missionary era were won in one hundred years; the second million were added in twelve years, and the next million will be gained in six years. In China it took thirty-five years to win the first six, and at the end of fifty years there were less than a thousand who professed evangelical Christianity in that hoary old land; but at the end of the second half-century there are a round quarter-million in the Protestant Christian community there, and the numbers have increased sevenfold in two decades. - In India the increase has been even more gratifying. In the first of three decades it was 53%, in the second 61%, and in the third

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86%. Twenty-five years ago Korea was closed land, but to-day there are more than 200,000 who are either already baptized or are under instruction in preparation for that culminative act of Christian allegiance, and the numbers are increasing at the rate of 30% annually. Livingstone found Africa a "Dark Continent," but to-day the lights of a million lives shine around its shores and pierce into its interior. Whole nations, like Uganda, have been won from barbarism. In the South Seas the first band of heroic English missionaries were driven off the island of Tahiti only a little over a century ago. Up to the present that single little Christian island has sent 160 missionaries to the islands around about, and whole groups, like the Figis, have been Christianized. Uganda and the Figis, two of the darkest spots that civilization has ever entered, are to-day said to provide the largest percentage of regular church goers of any places in Christendom, and to be among the most peaceful lands known. In South India, the oldest of modern Protestant mission fields, and in one of the most difficult countries, the cumulative effects of the work is telling mightily, and gives promise of a greatly accelerated increase in numbers as the evangel attains the momentum brought by further years of success. The United South India Church alone numbers nearly a quarter-million members, while in all South India there are a half-million communicants in the church, and half as many more belong to the Christian community about the churches; in three years one Presbyterian mission has received no less than 3,000 converts. In Japan the numerical advance has been slower, but

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the moral success has been out of all proportions to the numerical increase of the churches; there are only 70,000 Protestant church members, but they are increasing at the rate of 10% per annum. They are of the more potential classes, and exercise an influence in society and in the state out of all proportion to their numbers. It is claimed that a million of the educated youth of Japan hold the New Testament as the one authoritative ethical code, and order their lives by it quite as well as a like number that might be selected from our churches at home. There is on the foreign field to-day a Christian community of more than 5,000,000 souls, about one-half of whom have been received into active membership of the churches. Ten years ago there were but 3,500,000, and fifteen years ago less than 3,000,000. At the present rate of increase there will be another million inside the next six years, and many now living will have their eyes gladdened by the sight of a million per year being added to the Christian host that is so rapidly arising in the regions beyond the seas.

But, gratifying as the evangelistic statistics are, they do not tell all the story. Multitudes receive of the good the missionary offers that do not openly profess the creed he takes. There are 10,000 missionary homes, every one of which is a neighborhood center, doing, in a way, the work of a social settlement. There are 160 mission presses upon which there are printed 500 periodicals, besides tracts innumerable and thousands of books. Through the diffusion of literature, knowledge on every theme that forms a part of modern knowledge is disseminated.

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Missionaries translate books of science, history, political economy, sociology, and law. They acquaint the backward nations with the progress of civilization, and put in their hands the knowledge and art essential to attain it for themselves. They conduct 25,000 schools and in them instruct more than 1,500,000 pupils. The instruction reaches from the kindergarten to the university and technical instruction. Through them they create a citizenship. In Japan the Doshisha alone has trained 6,000 native leaders for all walks of life. In Turkey instruction has been given to upwards of 40,000 annually, and when the new era came in a day there was a vast leaven of citizenship, instructed in modern learning, to hail the day with joy and to guide the uninstructed by the way of peace into better things. The missionary school became the harbinger of all the instruction modern India possesses, and set the model for both China and Japan. In the mission hospitals and dispensaries millions receive balm for their wounds and healing for their diseases, and, in the course of time, will bring to each nation a native medical profession, competent to care for its own ailments. A native ministry is being trained, and the mission church is more and more relying upon it. When there is a competent native leadership for the churches, there will be an advance such as no foreign leadership can ever hope to bring, for the people of every tongue listen most readily and follow most confidently their own leaders. An old society, like the London Missionary Society, illustrates the trend in this matter. With an income of a million a year, they employ but 295 mis-

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sionaries, and have a staff of native workers numbering 4,000 under their supervision. Their fields were among the first opened, and have been cultivated long enough to develop a native leadership. The Christian communities under their care number 400,000 souls, and their statesmanlike policy is an example to all younger mission boards. In the older South India fields there are 900 missionaries and 14,000 native workers. Quite as promising as the development of a native leadership for the mission churches is the rapid increase in self-support. To make comparison between the giving of mission churches and those at home, the basis must be not that of dollar with dollar, but that of earning capacity and the scale of wages. The 70,000 Christians in Japan gave \$150,000 last year, and wages in Japan are but a fraction of what they are in the United States. A most conservative estimate would make that sum worth a million dollars in American earning power. The Korean churches pay 90% of their native ministry and build practically all their own chapels and school houses. The Ceylonese Christians give an average of 36 days' wages out of each year for each member. The Congregationalists are among the most liberal givers at home, their giving being 50% higher than the average for the home churches, and they give only an average of eight or nine days' wages apiece per year to all the work of the church, or one-fourth what the Ceylonese give. The African converts in the Bolenge field, on the Congo, give one-tenth of their income as a minimum and add to it one-tenth of their membership as evangelists. In China the membership

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has increased eleven times in thirty years, and the ratio of native giving has increased thirty times. The Telugus and Tamils of South India earn from eight to twelve cents per day and give \$120,000 per annum. In 1900 the native churches on all mission fields gave \$1,833,961. In 1910 they gave \$5,249,405. Their contributions were trebled in a decade. In the same decade the home churches increased their missionary gifts by 80%, or a little more than one-fourth as rapidly as the mission churches. The mission churches are missionary to the last degree. They are not smitten with the smug and selfish and wholly perverted idea that the gospel is for them, or that there is any peculiarity of kind that makes them its beneficiaries, and rules out others as unfit or undeserving or as sufficient unto themselves. It is sheer atheism to talk about Christianity for the West, and contend that each people evolves the religion that is best for it. The West did not evolve Christianity; it received it at the hand of missionaries from the East.

The figures that tell of the awakened interest of the church at home are also inspiring. The Protestant Reformation began with an avowed hostility to missionary work. It has been only a century and a half since the first beacon light was sent to a foreign field, and for the first one hundred years little was done. We are now at the dawn of the missionary era. The church is awakened at last, and the interest of the past decade is eloquent with prophecy for the future. The total support has grown from \$17,315,526 in 1900, to \$32,139,509 in 1910, or an increase of almost 100%. The Laymen's Missionary Movement is es-

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sentially a pocket-book movement; it is an awakening of incomes to a responsibility of stewardship. The class that holds the purse strings are discovering in the mission fields spheres for investment that pay as do no others. The campaign was inaugurated in Toronto in 1908; that city's gift increased from \$175,000 to \$363,000 the first year, and went up to \$411,000 the second. It is a fair index of the generosity the Movement is to bring, it means the most adequate financing of opportunities offered in the field that has ever been realized. The number of missionaries has increased by one-third in the decade, and the number of employed native workers by one-half. The missionary host is increasing at the rate of 3% per annum, but the opportunities are increasing at double that ratio. In the past four years the Student Volunteer Movement has furnished 1,275 new missionaries, and has some 6,000 recruits preparing in the various colleges for future enlistment. Their increase over the past quadrennium was 27%, and was 64% over the one before the last. The church at home is awakening, but she is yet bestowing \$12 per member upon herself each year, while sending only 40 cents to the mission field. She supports one minister for every 140 members at home, and wastes vast sums upon denominational enterprises that duplicate the Christian efforts of sister churches. She supports an ordained worker for every 400 people in the home field, and supplies one for every 200,000 in the lands that have no churches, schools, books, hospitals, or Christian homes, nor the mighty influence of Christian civilization. To-day there are on the field 21,248

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missionaries and 91,513 native helpers, or a total missionary host of 113,207; ten years ago there were 91,899. To-day there are 45,540 places of work; ten years ago there were 28,135. If the whole church could be endued with the spirit of the Moravians, the task would be undertaken in a manner that would need no apologies. This little denomination of 30,000 Christians is to-day supporting over 400 missionaries, or one to every 68 members. The entire American church supports but one missionary to every 2,500 church members. The Moravians are giving \$400,000 annually to support their mission churches, or \$13 per caput for their membership. If all the churches did as well, the world would be evangelized in this generation. They have been the pioneers in most of the fields and have often turned over established stations to those who came after them. They have 100,000 gathered into their mission churches, and are pushing forward into unoccupied fields with true Apostolic zeal.

Here in the brilliantly illuminated civilization of a Christian land we are asking the men on the outposts, "Watchmen, what of the night?" Truly does the answer echo, "The morning cometh." Never since the dawn of civilization have the signs of its coming given such assurance. But figures do not adequately tell the story; they are but indexes to the larger volume of missionary accomplishment. Where thousands accept the definite evangel of the missionary, tens of thousands receive the benefits of his new truth and the better way of life. While a native church is being established, a whole nation is being leavened

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with a higher ideal and the old is giving way to the new. The missionary is the pioneer of a new epoch in the life of every people to whom he goes. In the West we are not all Christians, but we all live in Christian lands. So in the East, and in the savage lands, the missionary is bringing that social uplift that transforms custom and elevates whole nations and changes the face of the earth.

3. THE LEAVEN IN THE LUMP.

Christianity is taking the world "because it meets and supplies the deepest wants of men more perfectly than any other religion meets and supplies them," says Dr. Gladden. It is not claimed that Christ is the sole cause of progress, but that in his gospel and life are the most powerful factors that make for progress. John Fiske said that "religion is the largest and most ubiquitous fact connected with the existence of mankind upon the earth." "Pagan religion stopped the hand and neglected the heart," said Montesquieu. The Christian religion begins with the heart, and, placing there the motive power of action, sets the hand to every task that will redound to human welfare. Other systems may give ethical codes, but they bind them about the minds of men with a restricting literalism, while Christianity plants the seeds of principle in the hearts of men and leaves life to develop according to any variation that race, clime, or custom may demand. Judaism and Confucianism gave the Golden Rule negatively; they asked men to refrain from evil. But Christ gave it positively; he asked men to prosecute the doing of good. Between the two modes of action

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there is a continent of indifference. The one does no harm for self's sake; the other does good for other's sake.

Emerson said that the character of people was determined by their conception of God. Buddhism worships the perfected man. Gautama taught that there was nothing better to worship. He spent his life thinking through the problems of suffering and death. He forsook wife and child to lead an ascetic life, and to find the way of escape from the miseries of existence. His disciples practice charity for merit's sake, but the world is not good and God is not interested in a perfected social relationship. The end of the best life is either absorption of one's personality into Nirvana, or complete oblivion. Self-annihilation is not a social ideal. The extinction of desire is the supreme moral end of life to the faithful Buddhist.

Confucius taught that men should "respect the gods, but let them alone." Confucianism really has no personal God. Its disciples leave the worship of "Shangte" to the emperor. Most of them accept the spirit worship of Taoism and make obiesence to the tablets of their ancestors. Man has a duty to fellow-man, but it does not hinge upon his conception of God, and therefore lacks the moral sanction that Christian theism gives. Brahmanism has many gods. It boasts of a pantheon of 330,000,000 divinities. Its great deities are anything but moral examples. They are really incarnations of human desires; in them is found the entire gamut of human passions. Salvation is not through fellow-help nor love of one's kind. Their best sacred book, the Bhagavad Gita, teaches that

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even the evil person who worships correctly is deemed good. This illustrates the morals of the system. Mohammedanism teaches there is "one God and Mohammed is his prophet." It is not only monotheistic, it is iconoclastic. The future is fixed; law is supreme; none but Moslems can be saved. Mercy is not a tenet of Islamism. "After twelve centuries the Arabs are a nation of robbers," says Professor Marshall. It is no part of man to create a better order, God has fixed everything from the beginning.

None of these religions teach any such thing as a Kingdom of God. That which is the social inspiration and goal of Christianity is either denied or omitted by all of them. Their gods are either aloof, or non-existent, or implacable, or else they are interested only in a personal salvation. The world is either totally bad, is growing worse, or is a "wheel" upon which man is broken. It is never conceived of as a place into which "the heavens shall descend," and there "shall be a new heaven and a new earth." "One who has not examined the other religions can not know what Christianity really is," said Max Müller. Christianity is "the social hope of the nations," as Dr. Dennis demonstrates in his monumental work entitled, "Christian Missions and Social Progress."

If, as Fichte said, religion "seeks the realization of universal reason," may we not say that its end is the highest good of all? Benjamin Kidd, in his "Social Evolution," defines the scope of religion as being the subordination of the personal interests of the individual to the social organism, and says each type of civilization receives its characteristics from the ethical

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system implanted in it. According to his interpretation of history, not economics, nor politics, nor racial types, nor any other single thing determines the evolution of progress, but amid them all religion is the most powerful factor. It strikes deepest into human motives, and though it be inscrutable to those who profess it, it nevertheless furnishes the chief sanctions for action.

Christianity is neither a system of doctrine nor of morals, though it furnishes the world with both. Its dynamic is in a person. Christ said he was "the way, the truth, and the life," and "I came to bring life and bring it more abundantly." He asked the world to learn of him, but it was not in knowledge, but in doing that it was to find life. Christ exists to-day in millions of hearts, not merely as a philosopher or a lawgiver nor even as a saint, but as a friend and helper, the most vital reality in experience. No other religion offers the dynamic of such a personality. "Social efficiency rests upon qualities of character." If, as Kidd says, "the one essential" is supernatural sanction of some kind for acts and observances which have a social significance, then Christianity's secret as the greatest social leaven in the lump of the world is explained by the character of its founder and the mystery of his abiding presence in the hearts of his followers. His was "the mightiest heart that ever beat—stirred by the Spirit of God; how it wrought in his bosom," said Theodore Parker. In his life men find that ideal which the minds of the greatest have ever sought in vain in their visions. In his promises they discover principles of action that "decide ques-

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tions we scarcely dare agitate as yet." In his love they discover the most indefinable mystery that even religion has to offer. Other religions have their martyrs, men who died rather than surrender their faith, but what other religion sends men gladly to a living martyrdom that they may give self for the sake of others? Here is the social power of Christ's religion, his "throne is a cross," his inspiration is that of human service, his way of life is through good to others. "The power of the love of Christ has been displayed alike in the most heroic pages of Christian martyrdom, in the most pathetic pages of Christian resignation, in the tenderest pages of Christian charity," says Lecky. "If the life and death of Socrates were those of a philosopher, the life and death of Jesus were those of a God," said Rousseau.

The reproach of Christ was the source of his power. "He emptied himself, taking the form of a servant." So his disciples were exhorted by Paul, in his letter to the Philippians, to be of the same mind, and in lowliness, each counting other better than himself, think of the things of others as their own. It has been the inner circle of the faithful that has given the world its Christian civilization. The virtues they display are those we turn to for the explanation of all that is best in our civilization. Christian sacrifice is not for personal escape of penalty, but for the help of the "least of these." If it be said that "salvation is character," it can, too, be said that sacrifice is service. The Emperor Julian reproached Christianity for its doctrine of the equality of man. By that doctrine it has overthrown despotisms and destroyed feudalisms

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and created democracies. Lucian ridiculed it for brother love and especially love of slaves, "whom the gods ignored as men of inferior nature." But that brother love has lifted up the fallen and made the very salt of society. Through it slavery has been overthrown and millions redeemed from bondage. By it the teaching of Plato and Aristotle that the masses can be but hewers of wood and drawers of water, and therefore have no place but to serve the elect of the race, has been supplanted by making of them citizens in their own right and by giving the government of nations to their will. Celsus satirized it for its message to the poor and weak and sinful. But Gibbon said, that while the empire deteriorated in luxury, a pure and humble religion gently insinuated itself into the minds of men, grew up in obscurity, derived new vigor from opposition, and finally planted its banner of the cross on the ruins of the capitol. The dispossessed are made the redeemed, the humble are exalted into greatness, the poor become rich in those things that do not destroy character. As egoism, privilege, and luxury ruin a people, Christianity saves through the implanting of unselfishness, charity, and humility.

"It was reserved for Christianity to present to the world an ideal character, which through all the changes of eighteen centuries has inspired the hearts of men with an impassioned love, has shown itself capable of acting upon all ages, nations, temperaments, conditions, has been not only the highest pattern of virtue but the strongest incentive to practice, and has exercised so deep an influence that it may be truly said that the simple record of three short years of active

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life has done more to regenerate and soften mankind than all the disquisitions of philosophers and all the exhortations of moralists," says Lecky, in his "History of European Morals."

It is this same religion that, in its purity and gentleness, is insinuating itself into the arrested life of archaic nations, planting itself in the unleavened mass of heathen races, bringing to them a light in learning, and giving them that mightiest of all civilizing agencies, the consecrated personalities of men devoted to their welfare. "Subtract the Christian personalities and the ideas that reigned in and lived through them, and you have but the struggle of brutal passions, of men savage through ambition and lust of power," says Dr. Fairbairn.

Civilization is awakening to the fact that "there is also a missionary interpretation of history." Carlyle believed that progress came through the leadership of "heroes" and by "hero worship." A more modern theory is that it comes through the leavening personalities and combined activities of groups of men devoted to a common idea. The missionary goes as the emissary of a new and better day. He alone of all the men who reside in foreign lands is there for an utterly unselfish purpose. He alone of all classes of men who mingle with alien peoples believes in their potentialities, and has supreme confidence that what has made him an enlightened being can make every other man the same. He has nothing to ask but a chance to be understood and an opportunity to apply his gospel. He is never defeated, for if he dies there are always ten to ask for his place. His sufferings

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are turned into balms of blessing for the children of his tormentors, and, if he is martyred, his "blood becomes the seed of the church." He is the "pioneer in every reform, whether it be religious, social, or moral," said Tahir Ram Gunga Ram, a Hindu scholar. All are impressed by "the nobility of spirit, the simplicity of life, and the single-minded devotion to high aim," claimed for him by Sir Chas. A. Elliott, Lieut.-Governor of Bengal. He is a "worker together with God," and "fills up in his own body what lacks of the sufferings of Christ," that by his sacrifice he may communicate the sacrifice of Christ. There are many testimonies to his efficiency in the work he goes to do. Two will be given here. One is taken from the *Japanese Mail*, a secular paper, edited by non-Christians, and quoted by Dr. Dennis. "They lead the most exemplary lives; devote themselves to deeds of charity; place their educational and medical skill at the free disposal of the people, and exhibit in the midst of sharp suffering and diversity a spirit of patience and benevolence such as ought to enlist universal sympathy and respect." The other is from the words of Sir Harry H. Johnstone, British High Commissioner to East Central Africa, and a man who has spent many years in mission lands. He says, "They have done more good than armies, navies, and treaties have yet done."

4. TIME AND THE TIDES.

Customs change slowly. Nations and civilizations are not made in a day. The Kingdom of God cometh without observation. It is first the blade, then the ear, and then the full corn in the ear. Progress pro-

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duces its cataclysms, but its great eras are not produced by cataclysms. The progress of Christian civilization is that of the leaven in the lump. There is much yet to be leavened. It is, indeed, one of the supreme obligations of the church to create social justice at home that she may the better deal with the social problems she is creating in the rejuvenation of the peoples of the earth. We are not yet purged of all our paganism; when we are the millennium will have come. Our confidence is in the comparison we can make with the social conditions that Christ found in the world, and those that the missionary finds where Christ is not known. What the missionary finds is a challenge to us to give what we have received in the faith that what has been done for us will, by the same power, be done for them.

The Roman historian, Tacitus, tells the story of our pagan ancestors in the forests of the Rhine. They had reached about the same status as had the American Indian found by the white man in this country. They were a barbarous folk, dressing in skins and dwelling in caves and in tents of hide. The men fought and followed the chase, and the women cultivated rude plots of ground. They were straight, ruddy of complexion, blonde haired, deep chested, and vigorous. They ate raw meat, and, in times of great victory, drank from the skulls of their vanquished foes. If they wanted a bird to eat, they selected a smooth stone from the brook, and, with the unerring aim of savage arms, skilled in all the arts of the chase, brought him down from his perch in the trees. If they wanted fish, they either trapped it with their hands or hooked

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it with the breastbone of a small bird. If they ran across a bear they surrounded him, as the Africans do the hippopotami, and beat him to death with their clubs. The Prussians of North Germany and the Druids of England made human sacrifices, and it is probable that all the tribes north of the Alps did so until centuries after the beginning of the Christian era.

Culture failed to make Grecian civilization permanent. There lived at one time in Athens, then a city of less than ten thousand, no fewer than eighty-four men whose names are known until this day. Greek sculpture and Greek physic have never been surpassed, and Greek philosophy is still mediating the speculations of thinkers; but Greek civilization failed. It did not have the saving salt of social righteousness. Its democracy even was that of an aristocracy, while the masses were but servants of the elect. The famed Roman Republic went down upon the bar of patricianism. No civilization will endure if it sets itself to cultivate a privileged few. Its only surety of permanence is in the steady progress of its powers in creating a democracy. Roman power became the power of the select and privileged; social justice was not created; there was no equality of man and no enthusiasm for humanity. The emperor became the state. Stoic jurisprudence did much to evolve a technical justice, but it never recognized essential human equality; it never gave the slave human rights, and it never elevated woman to the plane of man before the law. The voice of the people never became the voice of God in imperial Rome.

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Individual rights were suborned in favor of patrician privilege, and the state came to be administered for the benefit of the rulers. Material power became regnant—a sure sign of inner decay—and luxury brought dissipations that ruined the favored, while poverty brought weakness and immorality to the masses and thus undermined the foundations of society.

The social status of the society to which Paul took Christianity is indicated by the patriarchal state of the family. The father and husband was supreme. The wife was under “tutelage,” *i. e.*, she was a minor before the law. If she brought a dowery, it passed from her control to that of her husband; her inheritance was only equal to that of one of the children. She had no legal rights over her offspring. She was an inferior being and her husband's rights were despotic. Children had no rights; they were the property of their father; he could expose them to death if not wanted at birth, or he could sell them to whomsoever he wished. The Lactrian columns in the midst of the city of Rome were the appointed place to which little ones could be brought and left to the tender mercies of the slaver, or of the man who wished a servant. Whosoever desired could take away the little body that parental obligation refused to consider, and for whom there was no parental love, unless perhaps it was that of a mother who dared not oppose her husband's determination to put it away. There were few mercies for the weak, the poverty-stricken starved without public relief, and the unfortunate bore their own burdens or died under them. Work was

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not respected. Labor had no dignity. It has little enough yet, but it is at least respectable, and has the right to its own body and to bargain for its own wage.

In the Roman Empire there were 60,000,000 slaves at the time of Christ. In Athens there were but 21,000 freemen when the population was 200,000. In Attica, the seat of culture, three out of every four were bondsmen. Plato made the majority of men slaves in his ideal republic. Aristotle condemned the majority to become hewers of wood and drawers of water, and had no faith that human nature could ever make them worthy of aught else. Cato allowed old and sick slaves to be disposed of as a burden. Cassius defended the law in a case where, according to law, 600 were executed because one had killed their master. Seneca says Pollio mutilated slaves in anger and fed their flesh to the fishes. Juvenal asked, "How can a slave be a man?" Ulpian speaks of "a slave or any other animal." Seneca said, "A slave has no home or religion." Stoical jurists ruled that they were property the same as animals. They could be attached for debt, their testimony was admissible only under torture, and marriage was never legalized for them. Their first gleam of hope came when Constantine's code began to implant the rudiments of the Christian ideals of humanity.

Paganism is egoistic, proud, and selfish. It seeks every one his own and might makes right. Christianity is altruistic and implants a fundamental respect for the things of the other man. Harnack says it was the moral power of Christianity that maintained it during the early centuries of persecution and finally

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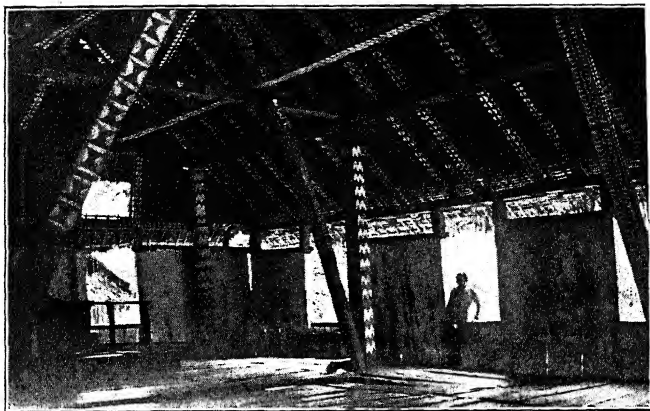
carried the world for it. Greece and Rome were starkly individualistic. The church became popular and bargained with paganism. The pure faith was adulterated with heathen custom, and for a thousand years Christianity was shorn of her pristine moral power; but she never lost it, and during even the "Dark Ages" the heaven was working. Whatever the custom, it will be found that there was a protest somewhere among the prophetic souls who had not lost the vision, and that their light was as a pillar by night, guiding the courses of history.

Ulfilas crossed the Alps with the gospel in the year 344 A. D. He had been captured in one of the northern raids of the Emperor of the Eastern Empire and his ruddy vigor, fighting powers, and handsome countenance won him imperial favor. He was educated and was offered a place at the court, but he had attended the churches in Constantinople and learned the gospel of peace, and he longed to herald its message to his barbarous countrymen. He left court and civilization behind him and made his way alone to native land, with the sacred Scriptures as his choicest weapon. He translated the Bible into his native Gothic tongue, after having reduced it to writing. A single illuminated copy of his translation is yet held as an invaluable heirloom of Western civilization, and is preserved in the University of Upsala, in Sweden. In it our pagan forbears found the chart that led them into civilization. They were not transformed in a day; it took a thousand years to redeem them, and even then they had only purged out the grosser habits of barbarism; and it has taken another half millennium

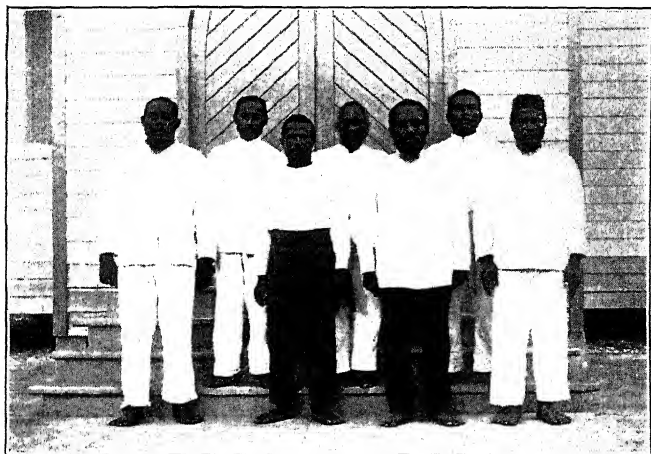
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to bring the refinements of our modern life. It is the law of the heaven.

In the year 208 A. D., Tertullian wrote that "places in Britain not yet visited by the Roman are subject to Christ." In 314, British delegates are found at the Council of Arles. St. Patrick's work in Ireland was done during the first half of the fifth century. It was a century later before the gospel really obtained a hold in Scotland, through the work of Columba. Not until the year 700 A. D. could the British Isles be called in any sense Christian; it had taken five hundred years to make them so. Ireland became a missionary recruiting ground and "the greenest spot in Christendom." From her training schools and evangelical activities flowed out beneficent streams of missionary activity to Friesland and Germany. Willibrord pioneered on the mouth of the Rhine in the year 690 A. D. The Prussians were still killing their deformed children and their aged, and burying wives and slaves with their deceased lords. The Saxons were still sea-rovers and pirates. So savage were the North Germans, that for two centuries, between the years 1000 and 1200 A. D., none dared go to them. It was not until 1209 that a missionary, named Christian, succeeded in obtaining residence among them, and it was a thousand years from the days of Ulfilas before the gospel was recognized over all Western Europe. The hardy Norsemen were among the rudest and wildest of the Teutons. Willibrord went to them at the close of the seventh century, but was repulsed, and it was not until the year 827 A. D. that Ansgar began the work that finally prevailed. It took two hundred years to



A Native Church in the Marshall Islands, South Pacific Seas. Illustrating native carving and building under missionary instruction.



Officers of a Native Church in Marshall Islands. These people were naked cannibals a generation ago.

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make Denmark Christian, and the island of Bornholm did not surrender until 1060. Sweden held out for another one hundred years, and Lapland did not yield until late in the thirteenth century.

If it took a thousand years to convert modern Europe, shall we not marvel at the progress made in a single century in an arrested civilization like that of China, or in that of a century and a half in an ancient and debilitated nation like India, or in the half century's attainments in proud Japan? These nations have the conservatism that comes with ancient custom and a static half-civilization. Christianity comes to them with the impact of its Western attainments; it is borne on the wings of inventions, and brings a world of progress that commends its message in a thousand ways. It has obtained a vast momentum in the world, and by that law it will overcome more quickly in the East than it did in the West. It is estimated that there were 50,000 Christians at the end of the first century. At the end of the first century of Protestant Missions in China there are 175,000 communicants, and at the end of the first half-century in Japan, much talked of as one of the fields of slow returns, there are more than 70,000 church members. Facts demonstrate where theories only contend. Christian missions bring the undeniable success of a new and better society, and challenge interest through the offer of a better way. In times of change men breathe ideals as atmosphere, and the masses adopt them without stopping to debate them. Thus there is a mighty evangelism in custom, and the Kingdom of God comes in ways that figures can not register.

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Time and the tides of progress make for a new era, new ideas create new forms, and whole peoples are lifted nearer unto the Kingdom that Christ came to establish in the earth.

5. THE MAN AND THE IDEA.

The Duke of Argyle said that when you planted an incompatible idea down alongside a false belief, a superstitious practice, or a cruel custom, there was bound to be a revolution. The missionary is a man with an idea. And he not only possesses the idea, it possesses him, it is incarnate in him, he becomes the idea in action. That idea is one that brings a sublime faith in the possibility of man; it fills him with an optimistic outlook on the world; it is backed by unshrinking confidence in the potentiality of his own life, weak as it may be, because he feels God is in it; it gives him a vision and he lives for it, though never expecting to live to see it, for he is strangely unselfish of that which moves most men to action and enjoys giving his life for others. His idea is that the good news of Christ is able to save unto the uttermost. But he does not expect that idea to work by itself. Christianity is never impersonal. When Peter confessed the Lordship of Jesus, the Master told him that it was upon such confessions he would build his church. The Church of Christ was to be builded out of men who accepted his Lordship and undertook to live his kind of life. Paul told certain of his converts that they were his "epistles, known and read of all men." The missionary not only takes the gospel, he is the gospel, and the testimony from the foreign field is universal

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that the mightiest factor in the winning of the pagan to Christ is the life and love of the missionary. "The mightiest civilizing persons are Christian men," said Dr. Fairbairn. He goes, not to confer blessings but to implant them, and when he gets them truly implanted into the hearts of his hearers they in turn become incarnations of the idea and carry it on to others.

Henry Van Dyke tells a little legend of how Jesus was condoled with when he reached Paradise because his project of saving the world had so tragically failed through his life being taken away. He replied, in surprise, that there had been no failure, for Peter and John and all the disciples would tell it to others, and these in turn to others, and so as each heard and accepted he would tell it to others, until at last the whole world shall have heard it and believed, and the Kingdom of God will have come. Darwin said, "The lesson of the missionary is that of an enchanter's wand." He was atheistic so far as the claims of theology were concerned, but in islands off the coast of Patagonia he had seen the transformation wrought by the missionary, and his faith in their power to make mightily for the evolution of mankind was so great that he sent a missionary contribution thereafter every year of his life. What was true of Darwin is true in this day, both at home and abroad. The journalistic interest in missions, which has so rapidly arisen in the past few years, is because men of the world have seen the forces for civilization laid by the missionary and noted that the results are fairly dramatic in their surprises. The awakening of statesmen

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has not been a theological but a sociological awakening, and they advocate missions because of their contribution to human progress. In the foreign fields themselves the leaders of the nations which are adjusting themselves to the world order of affairs do not hesitate to give the missionary his just assessment as a contributor to their new national life. They contribute to his schools and hospitals and read his literature; they invite him into their councils and send their sons to him that he may prepare them to take part in the new order of things; they testify that he brought the idea to them and that his life has commended it to all who have understood.

The missionary is thus the pioneer of social progress in the non-progressive and barbarious nations. He alone goes without a selfish interest. He alone seeks to understand the people to whom he has gone, and to confer benefits instead of seeking them. He alone does not despise them, but gives them his fullest confidence and advocates their cause even though they underestimate his motives, or even if they so fail to understand him as to traduce him and martyr him. Greatest of all, he communicates his spirit to his converts and they become willing sacrifices upon the altar of the old order that the new may come. The history of every great missionary success is written in the sweat and blood of the native converts. If they have not given their lives in blood and flame, as in the martyrdoms of Uganda, Madagascar, and China, they have given them in living sacrifices for the sake of their neighbors whom the gospel taught them to love. Their teacher incarnates in them his own

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Christ-like faith in men. In Korea the native elders of many churches will not accept an inquirer for baptism until he has brought another inquirer to be taught. In Samoa, Robert Louis Stevenson, who had met most of the great of earth in his time, said of one of the native missionaries, that he was the finest specimen of Christian manhood he had ever looked upon. James Chalmers wrought for years with the native missionaries of the South Seas, and boldly compared them with the choicest and most heroic spirits of history. In China to-day young men are turning from lucrative governmental positions to teach their fellows the riches of the knowledge of Christ. The missionary gives the people a vision and they do not perish, but are made alive with new life. He multiplies his number by scores and finally by hundreds and thousands, and these become the leaven of the nation. Their numbers are no criterion to their value in the life of the people. Their influence is out of all proportion to their power. Upon their backs, as upon that of Atlas, a world is lifted into new being.

It was an apothegm of ancient paganism that "a man is a wolf to a man he does not know." The missionary turns men from the conquest of one another to that of self and of nature and its hidden powers. He teaches the Brotherhood of Man, and puts faith in the place of the old and paralyzing suspicion that characterizes heathenism. He demonstrates that it is more heroic to die for a cause yourself than it is to kill another in behalf of a cause. His way of progress is by means of service rather than by the way of material gain. He brings material gain as one of the

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inevitable consequences of civilization, and a new conception of toil as more honorable than idleness, and implants the revolutionary idea that every individual has an inalienable right to his own life and the fruits thereof, but he does not bring a materialistic conception of progress, nor seek to confer a higher life through the worship of mammon. With Edward Everett Hale he believes that "progress is always spiritual," and so seeks to found the fundamentals of it in the moral life of a people that the flood and ebb tides of worldly acquisition will never be able to sweep them off its firm foundations.

The religion he takes is unlike all others in that it is not racial or nationalistic. It does not rely upon mass movements for its conquests, nor seek to gain peoples through battles, or by law. Charlemagne sought to convert the Saxons to his half-learned Christianity by a military crusade. He had to repeat the military invasion several times, but found that they were as pagan as ever. A wise bishop of the church advised him to try the more Christly method of persuasion and benevolence, and they were won. Vladimir accepted Christianity as a matter of state and sent priests with soldiers to baptize his subjects. They had the choice of baptism or death and chose the former, and Russia is unto this day half pagan; it has a form of religion without the substance thereof. Christianity makes its appeal to the individual. Jesus frankly sought out men. He refused to lead a nationalistic movement and spent much of his time with single individuals. His conquest of the earth must proceed by the process of winning single individuals. But

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these individuals are never to be individualistic. They become social factors in just the measure that they become his men. None of them lives unto himself, but counts the things of others as his own. The individual is the beginning of the conquest, but society is the end; he is the factor through whom the gospel works for the upbuilding of the Kingdom of God, but he is never apart from the whole of humanity, nor is his obligation ever discharged until the whole world is redeemed, and redeemed in all its ways. A native Hindu has said, in commending Christianity, "The best way to raise the individual is to raise the society of which he is a member."

The missionary goes to his task with a divine patience. He looks upon himself as a "worker together with God," and he is willing to sow and nurture while a Divine Providence brings in the increase. Livingstone and Gordon knew Africa, and felt its woes as did no other living men, but they did not fret over it. They knew that the processes of a universe are slow and they were willing to wait, content only if they had done their part. The missionary idea is optimistic. It is surcharged with the faith that all things are possible. History testifies eloquently to its force, even when it has been borne in earthen vessels. It comes not with theories or speculations or ologies, but with life itself. Stanley believed that if all the rest of the world were suddenly bereft of Christianity, there was enough vigor and understanding of the simple and essential things of it in the native Uganda church to spread it over the world again.

It has been a man with an idea that has inaugurated

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every reform and marked the beginning of every new epoch. The idea of Jesus that every man could be saved, and that it was possible to create a perfect moral order of society through fealty to the things desired by the Heavenly Father, is the most potential that was ever loosed in the minds of men. It is the missionary idea, and with it the missionary goes to his task, "becoming all things to all men, if by any means he may win some." He makes commerce and railroads and telegraphs and schoolhouses and governments his handmaidens, but the thing he does is to create a new Brotherhood of Man in the name of him who was a friend to every man.

CHAPTER II

The Home: The Corner-Stone of Civilization

1. HOUSE OR HOME.

Christianity offers the world the ideal of a home. Paganism has no term for home. The abiding places of men are simply houses. Where there is no mutual refinement or respect between husband and wife there can be no true home. Heathenism demands that the wife regard the husband with an attitude of worship, while he may look upon her with total disrespect. In him she is to find her salvation. Dr. W. A. P. Martin says he saw three thousand women praying in a temple in China, and their petition was that they might be reborn men. Hinduism and Buddhism alike teach that her only hope is to serve him faithfully, that she may be saved with him and serve him forever. Thus she has willingly immolated herself on his grave and received praise for her devotion, for her husband was her god.

The Koran is a man's Bible. Woman had greater respect in Arabia before Mohammed than she has under his teachings. To satisfy his desire for many wives the rule of polygamy was made. He limited his followers to four wives each, but took many more himself, and allowed concubinage. He sanctified

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polygamy, slavery, and divorce, and made them all man's prerogative, while woman became the victim of each one. Consequently there is no home in Islam. The harem is a house where the wives, concubines, and slaves of the wealthy Moslem are kept. It knows nothing of love unless it be the passing favor of the lord for some pretty young inmate of his establishment. It is a place of jealousy, intrigue, and suspicion. Mrs. Isabella Bird Bishop says she was approached scores of times with the request for poison to put an end to the life of the favorite or her child. She describes the pleasures of the harem as being disgusting, and the language of common conversation unfit for refined ears.

What is true of the harem is true of all polygamous homes. They are simply houses where the family live and are sheltered and fed, but they have none of the sanctity of a real home, nor can they have, for two wives can not dwell together in harmony—it is not nature's design. Polygamy implies the subjection of woman and the lordship of man, and thus destroys that equality without which a home can not be founded. There is a Hindu proverb which says, "The cow is sanctified, but woman is depraved." The masses of people do not accept that proverb literally, for there is much affection between husbands and wives, and especially do sons reverence their mothers as far as it is possible for a "superior" being to reverence an "inferior." But the ideals of heathenism are all against the wife and mother because she is a woman. Christianity offers no loftier sentiment than that for mother. Its ideals exalt woman's function and thus

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exalt the home and make it what De Tocqueville called it—"The cornerstone of the nation."

The family meal is the altar of the Christian home. There reverence and gratitude are paid the Creator, and the sacrament of family communion is kept. The bonds of family affection and mutuality are hallowed with converse over topics of common interest, and all minds and hearts are made one as they partake of the food that is provided by the co-operation of all its members. The pagan family does not have the common meal. In Africa and other savage lands the woman eats alone and after her lord has departed. In more cultured pagan lands she serves him and partakes of what is left. Among some barbarous peoples she is not allowed to eat of the same kind of food that he does. Even in Japan it is not good form for the ladies of the house to eat with the husband and guests. The rule in pagan households is for the sexes to eat separately. The female members of the house are the servants of the male members.

Modesty is the means in which society clothes itself for the protection of the finer sentiments, and the practice of it is the line of demarcation between the lower and higher forms of social life. It begins in the home and in the mutual regard its members possess for one another. It is the safeguard thrown about young people to guarantee purity of manners and the sanctity of virtue in their commingling. It is wholesome when it is unconsciously practiced, but becomes a means of unholiness when it is not natural and worn with grace. Christianity cultivates a natural modesty. It clothes womankind with refinement of manners

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and gives her the freedom of friendship and the fellowship of innocence. Paganism suspects womankind. It regards her as a snare rather than a grace, and a danger instead of an inspiration. It allows no courtship because it has no confidence in virtue. The right to choose a life companion is denied youth. The contract is made by parents or guardians, and there is usually a money consideration involved. The exchange of money implies the relationship of servant where the groom pays for it, or that girls are a burden to be disposed of where the father of the bride pays it. In savagery girls are sold as slaves and treated as such. A man's wealth and social position are determined by the number of wives or female slaves he possesses. In India girls are a burden because they must be married with a dowry, *i. e.*, some man must be paid for taking them. In both cases there is a sensual idea of woman's position. In the zenana she is kept in seclusion because she is not trusted. The purdah is the result of an age-long attitude of suspicion toward womankind. The Moslem either confines his wife in the harem or compels her to wear a veil in public. In either case he advertises his distrust of her and breaks down that sense of unconscious modesty that makes womankind the symbol of all that is purest and best to the Christian mind. Her seclusion, and the walls of distrust built around her by heathenism, deprive her of confidence and destroys her integrity.

It is a Christian proverb that no house is large enough for two families. Every home has its holy of holies, into which none may come but its own im-

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mediate members. The intimate bonds of the home are those of closest relationship, and to destroy the inner confidences with the encroachment of even beloved friends or other relatives is to weaken the home bonds themselves. Christianity says a man shall leave his father and mother and cleave unto his wife, and they twain shall be one flesh. The patriarchal household makes this close attachment impossible. In India and China as many as forty are found under one patriarchal roof. Sons bring their wives to the parental roof-tree, and all are subject to the father so long as he lives. The daughter-in-law must obey her husband's mother, and is often the subject of tyranny. There is a common treasury and the mother provides the common pantry. Delinquent members of the family come to be provided for, and there is no inspiration for the various individuals to cultivate thrift. Idleness begets idleness, and all are pulled down toward the level of the least worthy of the household. The house is the scene of quarreling between the various wives and families, and envy, distrust, and jealousy run riot. An imperious old woman can make life an inferno for every daughter-in-law, and sons are set at strife in defense of their families, or husbands and wives at variance through hatred of the women for one another. The intimate confidences are lost to the children. They have no sense of family life as they have in a Christian home, and are used to bickering and strife, and learn to be selfish instead of mutually helpful. There is much unrest with this manner of life in India wherever the better way of independent homes is seen through the coming of

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Western ways, but the orthodox sentiment is yet so strong that when the Madras legislature passed a law legalizing the right of every man to his independent earnings, riot was threatened and the law repealed.

The permanence of the home depends upon the sanctity of the marriage relation. The divorce evil is one that demands attention in our Christian lands, but if it is menacing here what shall we say of it in pagan lands, where there is almost no constraint? In civilized Japan every sixth marriage is dissolved; a few years ago it was every third one. Japan now has a law that makes divorce a matter of court decree, but it still allows the bond to be dissolved by mutual agreement, and, as a matter of fact, the larger number are thus dissolved. China allows seven causes for divorce, among which is talkativeness. Nearly all pagan lands allow a woman to be put away if she is childless, and most of them give the husband practically the sole right of divorce. Mohammedanism gives the husband the sole right; the common practice is to have one wife at a time, but to have many in the course of a lifetime. Short time marriages are common in Arabia and Turkey. One resident in Arabia says he scarcely knows of a man of thirty that has not been married to from two to five women. Where woman is not on a plane of equality with man he will not greatly respect her rights. If he regards her as having no soul, or as an inferior order of being, he will not be sensitive to her feelings. Where she is his servant and pawn, he ceases to think of her as one having rights, and so regards only his own selfish privileges and acts accordingly.

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The mission church insists strongly on the sanctity of the home, and makes regard for it a condition of membership. If a man has two or more wives he must put away all but one. This is a stumbling-block to many and a hardship to some, but it is the lesser of all the evils involved, for without a monogamous home there can be no permanent Christianity and no civilization worth the having. "A nation will not be better than its homes," says Shailer Mathews. Jesus made much of the home in his teachings, and used it as type and symbol in the profoundest things of his discourses. It is the cornerstone of civilization. From it flows all other virtues, and the safety of the home is the guarantee of progress. So the missionary refuses to recognize concubinage and polygamy and casual divorce. The young Korean and Chinese churches expel members who take concubines. There are no excuses or relenting, though it is a native proverb that "A man marries his wife, but loves his concubine." A native Chinese Christian tells blushing of how embarrassed he felt when he determined to walk with his wife upon the street, and of how such custom as the church taught him brought respect, and finally true affection for the woman to whom his parents had married him without his having seen her before the wedding day. In Japan the Christian custom is fast taking hold of the family relationship, and husbands and wives may be seen in public and at the table together. When the present Mikado proclaimed the constitutional régime he rode in public procession with his wife, and thus recognized a new attitude toward women; but he celebrated the twenty-fifth anniversary

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of his accession to the throne by taking another concubine, and his heir is the son of one of these secondary wives. The crown prince, however, has only one wife and treats her with all the respect of Christian custom.

The missionary makes a specialty of girls' schools. In India but one woman in every 170 can read. The missionary aims to teach every girl that comes into the church to read, and one-third of all the pupils in mission schools are girls. In Syria, Turkey, and Egypt especially are schools for girls thriving. The modern youth seek them for wives and they are honored. Their homes are models of cleanliness, as compared with the old type, and they preserve their womanly independence; refinement and reticence take the place of the old vulgarities, and the Christian home can be selected immediately from among those not yet redeemed by the higher ideals. Heathenism does not govern with a rational discipline, as indeed ignorance never does, but beats when angry and coddles when in good humor. The Christian home brings a higher type of intelligence and a more normal discipline for children, and above all, it brings a like regard for boys and girls. When plagues break out the Christian cottage is more nearly immune, because sanitation has been taught there and thus life is better preserved. In Samoa the missionaries established a school for the instruction of young married couples in the art of home-making. Marriage is made a matter of affection and not of barter, and the young lady is given, first, the right to womanhood before being compelled to enter domestic relation, and, second, the right to her own will in the choice of a husband. If custom,

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demands that she be not courted, as is allowed in Christianized lands, she can at least see the lad who is proposed for her and exercise the right of veto.

2. THE INDEX OF PROGRESS.

The place accorded woman in a society is an index of its state of progress. If no nation can endure half slave and half free, no society can progress half servant and half master. The laws of a state are a record of its customs; the maxims of its sages and wise men are records of its ideals. With these two records before us we have an understanding of the place accorded woman by the ancients.

In the Roman world woman was a ward of her husband. She was never his equal before the law but was under "tutelage," *i. e.*, under his protection and treated as a minor. In Greece not even her father could legally will her an estate in her own right. She had no freedom to go abroad before her marriage, but was kept in seclusion until she could go in her husband's right. Aristotle gave her a place between that of a freeman and a slave, and Plato said her place and honor consisted in keeping the house and obeying her husband. That great philosopher suggested a community of wives and that none should know which were her own children, in order that they might be made better citizens of the state; not a high tribute to motherhood to say the least. Pericles thought her most highly honored when no one spoke of her; as if the very mention of her was an immodesty. In Greece, as in Rome, she was a minor before the law and was treated as were her own children.

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In both Greece and Rome the husband had the legal power of life and death over his wife and children. The patriarchal forms inhered in the legislation of these governments. Upon marriage, any property she possessed passed into the absolute control of her husband. She could make no legal bargain after marriage, but must act through her husband. To mingle with freemen in public and listen to the lectures of the philosophers of olden Greece, or to obtain education for herself and have part in the learned professions, she was compelled to accept the position of an unchaste woman. Aspasia and others of the noted women of ancient learning accepted this portion that they might break the barriers that stood between womankind and a life of learning. The law expressed the position which she held in common judgment, though law usually follows the progress of custom, and she was often accorded privileges before the law recognized them. Augustus legalized concubinage, and in all social life the trend of imperial Rome was downward from the more severe codes of the republic. She was distrusted by the sages, and their ideas offered no hope of a better position to her. Plato spoke of her as "that part of the race which is by nature prone to secrecy and stealth." Seneca thought most women to be "cruel and incontinent in their desires." Cato declared "all women were plaguey and proud," and expelled Manilius from the Senate "because he had kissed his wife in the daytime and in the presence of his daughter."

So severe was the law that custom ran counter to it and there grew up a form of "free marriage" in

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Rome. It gave woman more freedom, but did it at the cost of her morals and her influence. Under it she could hold her own property and retain membership in her father's family, but the result was short-time marriages and every form of marital looseness. She could divorce her husband, and Seneca said, "There are women who count their years, not by the number of consuls, but by the number of their husbands." Gibbon says that "passion, interest, caprice, suggested daily motives for the dissolution of marriages." She had her choice between respectability under repression of her individuality, or freedom at the expense of her virtue. In neither case was she in a position of equality with her brother.

Our Teutonic ancestors, according to Tacitus, purchased their wives and held right of life and death over them by law, but held them in much higher esteem than did the Romans. She shared his camp and wilderness life and with him bore the burdens of war and the chase. Anglo-Saxon wives were known to have immolated themselves on their husband's grave. Polygamy was not unknown, but one husband, one wife, was the rule, and infidelity on the part of the wife was terribly punished at the husband's discretion. Her virtues were prized and she could inherit property from her father, though her husband alone could sell and manage her estate. She was under tutelage because she could not fight, but her position was a vast improvement over that of the luxurious South. Says Tacitus, "They carry on their affairs, fenced about with chastity, corrupted by no enticements of spectacles, by no excitements of convivial feasts."

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When these barbarians made conquest of Rome, they were horrified by the state of life they found, but fortunately Christianity had come with its redemptive social power and showed them the promise of better manners.

In the accounts of the life of Christ, and in the history of the Apostolic church, woman is accorded honor and esteem. Marriage vows were strict and the bond was one of equality. Through the infant church there grew up in the midst of ancient society the norm of a better social and family life, that in the course of time elevated woman to a position of universal honor and issued in the chivalric devotion of the middle ages. Formerly her weakness had made her the object of subjection, but it now came to make her the object of protection. Chivalry tended to make her but an ornament and to set her aside from the courses of virile life, but, once her position was redeemed from that of tutelage, she claimed her intellectual rights. The early church recognized her as an office-bearer and as the chief ministrant of charity. If it denied her the privilege of public discourse, it was only to save her from the criticism of an age that conceived of all public women as of doubtful character, and to the more securely fix respect for her in the public mind.

Constantine's laws first adopted Christian principles in any form into the Roman code. He did not go far in his inculcation of them, but he recognized them. He gave woman equal civil rights with man, and abolished concubinage and forbade any woman remarrying who had divorced her first husband without good

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cause. The later and more Christian code of Justinian abolished the absolute power of the husband, gave the wife legal rights to movable property, allowed her to become the legal tutor of her children, and began to make her the mother that modern law proclaims her to be. In the middle ages the church was paganized by the world to such an extent that the Christian ideal made slow progress, but the voice of the church councils was generally in favor of the larger rights of womankind. Canon law, *i. e.*, the law of the church, was more progressive in regard to women, children, and slaves than were the laws of the kings. The Christian kings from the days of Ethelbert of Kent and of Charlemagne led in the recognition of woman's growing rights, and especially sought to redeem her from purchase and insure her a dowery. Charlemagne took severe measures to repress divorce and declared he made the laws in recognition of the principles of Christianity. She was finally allowed to appear in court in her own behalf, and at last, in the thirteenth century, France declared her no longer under "tutelage." The old Germanic idea of force as the source of authority began to give way to the more benign precepts of Christianity, and the theory of innate human rights began to take its place.

The story of civilization is the story of woman's progress. No society can advance beyond the ideals it holds of motherhood. Christianity has abolished bridal purchase and has elevated woman from legal tutelage to the position of a freeman before the law; it has made marriage a bond of the soul, and the wife a companion of her husband instead of his servant;

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it gave the mother the right of guardianship over her children, reserved to her the privilege of giving her own hand in wedlock, and put her on an equality with her spouse in the obtaining of divorce. The religion of Jesus has ever championed the cause of the oppressed. It knows neither male nor female, neither bond nor free. In all its conquests it has plead the cause of woman and rapidly placed her upon a higher plane in society. No wonder the old pagan philosopher cried, "What women these Christians have!" She has ever held honorable place in the Christian church, and her virtues are the noblest our religion celebrates. "It is a fact significant for the past, prophetic for the future, that even as Dante measured his successive ascents in Paradise, not by immediate consciousness of movement, but by seeing an ever lovelier beauty in the face of Beatrice, so the race now counts the gradual steps of its spiritual progress, out of the ancient heavy glooms, toward the glory of the Christian millennium, not by mechanisms, not by cities, but by the ever new grace and force exhibited by the woman who was for ages either the decorated toy of man, or his despised and abject drudge," said the eloquent Dr. Stors.

3. MAN EVERYTHING, WOMAN NOTHING.

"The theory of heathenism is that man is everything and woman nothing," says one of the older missionaries to China. What was true of the world to which Christ came is true of the world to which his missionaries go to-day. The late Shah of Persia had eight hundred wives. The Emperor of China must have

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a royal household of women, and the higher officary follow his example. The Sultan of Turkey takes slave girls only into his harem, and they are freed only upon the birth of sons. The late Sultan was known to have killed one of his slave wives with his own hand. The Mikado of Japan keeps concubines and the King of Siam is a polygamist. African chieftains count their wealth by the number of female slaves, and in all savagery woman is property to be inherited, purchased, and sold as material goods, or animals. In more cultured pagan lands she is at the disposal of her father in marriage, and man's powers border upon, if indeed they do not become, that of a slave owner. In China, Siam, and India monogamy is the rule among the masses, but concubinage is allowed to all who can afford it, and divorce is in the husband's hands. To say there are no happy women in paganism would be gross error, but the average of happiness and the possibilities of living any adequate life are far below the average of Christendom. Indeed, it may be said that the masses of heathen women are content with their lot, but it is because they know nothing else, and it is Christianity's part to arouse a discontent wherever humanity is not living up to its highest possibilities. If one desires womankind to be demure and ornamental and to act the part of a beautiful toy, he could not do better than to go to old Japan, where her subservience and ingrained modesty make her petit and winsome and obedient. If he wishes her to be subservient, obedient, industrious, and dutiful, let him go to China where she makes her husband her lord and lives for the sake of her sons. But if he wishes her to possess in-

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dividuality, spirit, independence, and a mind of her own, he will go to no pagan land, but to those lands where Christianity has had the freest sway and she has come into that natural inheritance the Creator designed for all his children.

The proverbs and sayings of the sages are the same in modern pagan lands that they were in the ancient. In India the Laws of Manu proclaimed that "A woman is never fit for independence." They provided that she be dependent on her father until she had a husband, and upon her sons if her husband was deceased; if she had no father or sons, then upon her husband's nearest male relative, and if no male relative, then upon the sovereign. A reflection of this is found in medieval times by the Christian kings making the widow their special ward; but they made her such that they might provide her protection, while in heathenism she is made a pawn by those who are thus made her guardians. In India widowhood means disgrace. She must take off her jewels, shave her head, put on coarse garments, eat but once each day, attend no festivity, nor mingle with the crowd, for her presence is a curse; her husband is dead and she has no one to honor or live for, and, by the ideals of woman's place, should have died with him. She belongs to her husband for eternity and may not remarry, for her hope is in faithfulness to his memory; but if she had died first, her husband could remarry as often as he chose. She is preyed upon by wicked men, made a slave to her deceased husband's family, or sent home to be counted a burden in her father's household. In India there are to-day 25,000,000 of these poor, abject creatures

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of harsh misfortune, 115,000 of them under ten years of age, and none to pity aside from those whose hearts have been touched by the compassion of him who so often relieved the widow's distress, and made it the cardinal practice of his religion to visit her and her children in their distress.

"Man," said Confucius, "is the representative of Heaven and supreme over all things. Woman yields obedience to the instructions of man and helps to carry out his principles. She may take no step on her own notion and may come to no conclusion on her own deliberation." Like Manu, he prescribed that she must be obedient to her father, husband, or sons. He said the duties of the house were her sole business, and that "beyond the threshold of apartments she should not be known for evil or for good." The character that spells her name is closely akin to those that stand for strife and for disorderly conduct. Confucius' teachings regarding her individual rights were much like those of Plato. The Greater Learning said that "the only qualities that befit a woman are gentle obedience, chastity, mercy, quietness." Chinese women have excellent personal qualities, but are denied the rights of personality. She is married to whomsoever her parents choose and usually not allowed to see her betrothed until the wedding day. If she knows who he is it is immodest for her to speak to him or recognize him upon meeting. After marriage her husband may act without much reference to her feelings if he is so disposed. Very often he is kindly and treats her with regard, but it is not demanded of him by society. Her father may sell her if he chooses,

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and, in times of distress, does so without let or hindrance. She thinks of herself as an inferior being and knows nothing but the part of humiliation. If a Buddhist, she prays to be reborn a man that she may be saved, for none but men will be saved. As in all pagan lands, the philosophers look upon her as a necessary evil, and the masses make her a drudge. But in drudgery is her larger spiritual freedom. If she has to work she can not be confined to the house and her feet must not be bound. She is ignorant and apathetic toward the larger things of life and could not be expected to be aught but a gossip, a creature of intrigue, and quarrelsome. In savage lands she is frankly a slave. A man's wealth is measured by the number of his wives, *i. e.*, the number of his female slaves. She is the slave class because she is the drudge, while men are warriors and hunters. When protest was made to an African whose wife was carrying him over a stream on her back, he asked with all guilelessness, "If my wife should not carry me over, whose should?"

In pagan lands few women are ever allowed to claim the privileges of youth. They are married at tender age and burdened with the position of servant to their husband's mother and with the duties of motherhood. In China the term "slave-girl" is the one often applied to a bride, and she is married between the ages of seventeen and twenty. Her position is better there than in more southern Asiatic lands or in any of the savage lands. In India the Brahmanic law is that she must be married before twelve years of age, and one-half of all are wedded between the ages

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of ten and fourteen. The contempt of society is mightier than the law of the land, and not to be wedded before that age is to be disgraced. One girl child out of every eight is married between the ages of five and nine, and there are at least a quarter of a million who are betrothed in their cradles, or before the age of five years. In Moslem lands they are married before fourteen, and in Siam before twelve, or at thirteen she is sold as a serf to the highest bidder. In all these places spinsterhood is a disgrace not to be condoned, and if a girl can not be a wife she must be a slave. In Japan her father has a chattle right over her and may pawn her into disgrace as a pledge for money borrowed, or to pay a debt. Her only recompense is that the life into which she is thus bartered does not disgrace her for the conjugal relationship, and she may be married out of it in the course of time. This fact alone argues powerfully for the low plane of her position, as well as for the low order of morals in a nation.

Being an inferior person, it is not considered that she needs education. In China only one out of every two or three thousand can read and write. In India only six out of every thousand can do so, and the English Government provides a public school system. In Japan she is now being taught in the public schools and shows herself the equal of her brothers, as she ever has when allowed equal intellectual opportunities. Chinese girls find a wide open door and a crying need for their talents in medicine, and Japanese women are entering the teaching and nursing professions, after the manner of American and English young

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ladies. In India, where her ignorance is most abject and where it was said that you had as well put a razor in a monkey's hand as to give woman an education, she has furnished poets, novelists, teachers, and other leaders, especially in works of benevolence. Pandita Ramabai was widowed in early life, but she was in fortunate position, and coming to America interested Christian people in her design to found a home for her country's child widows. She began in 1889 with two, and now has over two thousand under her care in her community at Poona. Dr. W. A. P. Martin says the minds of these women are not dull, and that they are stupid only because untaught; that the girls of China are among the brightest of pupils and always possess the best morals. They have been reared in twilight, and when brought out into the sunlight of instruction they blossom with beauty. The untaught women of paganism become the chief conservers of the old ways, because they are immersed in superstition and are conservative through ignorance. To debase a mind is to make it its own worst enemy and to destroy within it all power of initiative. Women are the slowest to accept Christianity because they are most difficult of access, and because of the temperament acquired through subjection and superstitions. It is not to be thought that she has no influence. The very devotion in which she serves her lord gives her a vast influence over him. She has the care of her sons during their plastic early period of life, and as the only honor she receives is that of mother, she never loses a sort of dominance over them.

To the native mind it looks like social anarchy to

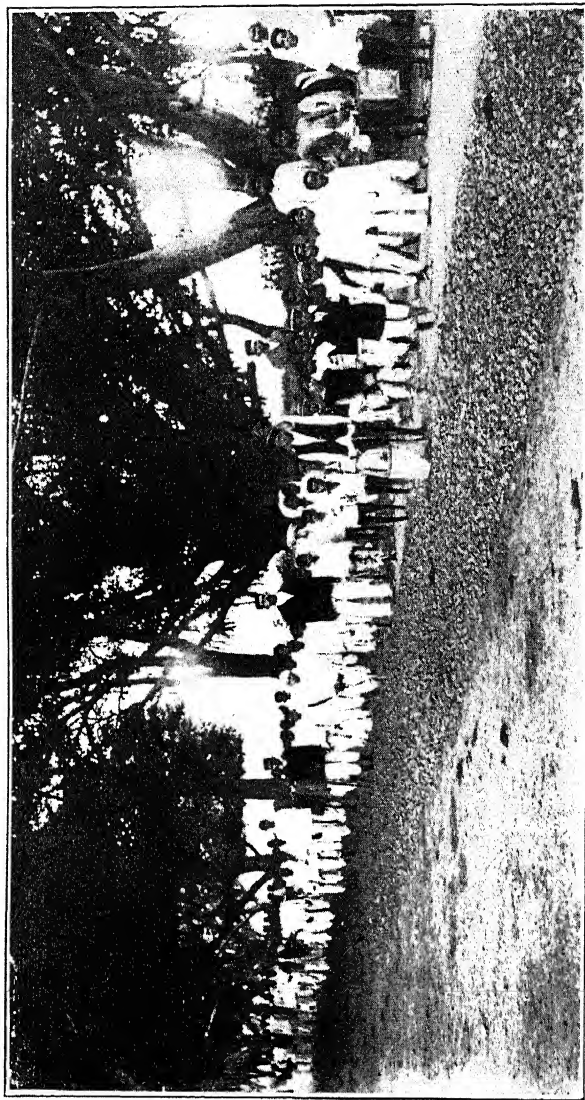
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so radically change the position of woman and to so reorder all conceptions of the home as Christianity proposes. Most of the household acts of pagan life are radically connected with religion, and the superstitious mind can see nothing but religious disruption in the change. In China the worship of ancestors is a household act and woman can not perform it; she must provide sons or her husband and his ancestors can not receive tribute. All her religious hope is in the present arrangement. In India every household has its idol, and daily obeisance must be made as a protection from the evil eye and other misfortunes. Woman knows no god except through her husband, and the idea of a personality for herself is foreign to her. No pagan religion holds a high ideal for woman. Christianity demands that she have the right to stand before the altar with her brothers. It asks equality of individuality for her when her husband has been accustomed to think it a disgrace to speak of her otherwise than apologetically. Even Buddhism, the most humane of all pagan faiths, gives her a character of passivity and makes her a negative personality, the shadow of her husband. Her status is fixed religiously, and religion is the mightiest of conserving forces, as well as the greatest of dynamics in reform. Whether it will act as a dynamic or a static force depends upon its principles, and Christianity is the one great re-formative faith.

Everywhere are the signs of awakening. Here again the missionary confers a vast benefit over and above the actual making of converts. The ideal of home and motherhood that he takes finds lodgement

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in the good soil of the better nature of men in heathenism and is bringing forth fruitage. Mere example is not enough. The Parsis have dwelt in Bombay for centuries, and their women have been given an equality with men and educated as their brothers have been. This fact, together with their rejection of caste, has made them superior among native Hindu peoples. But India passed them by without learning the lesson, and no Parsi would stoop to teach it, for his is not a missionary religion. But Christianity inculcates the lesson by entering into the hearts of men. It may not lift all conviction to the level of actual conversion to the church, but it lifts multitudes to the level of more humane custom and better ways of thinking. The Gaekwar of Baroda is not a Christian, but he is awake to the need of reforms in India, and is one of its most advanced rulers. He has broken caste by traveling abroad and openly preaches the superior social life of Christianity. As quoted by Robert Speer, in his "Christianity and the Nations," he says regarding India's women: "Early marriage must increase death and disease among mothers, swell infant mortality, and injure the physic of the race. A too strict Purdah mutilates social life and makes its current dull and sluggish by excluding the brightening influence of women. By denial of education to women we deprive ourselves of half the potential force of the nation, deny our children the advantage of having cultured mothers, and by stunting the faculties affect injuriously the heredity of the race." In Japan women are taking a place in intelligent society and in public affairs. In China a recent meeting to protest against the opium



Rahuni Vernacular School, Marathi Mission, West India. The boys are returning from their daily swim. All are taught English and a trade.

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traffic was not only attended by women, but they participated in it on an equality with men. In India societies are now organized looking to the redemption of her position through raising the age for marriage, encouraging the marriage of widows, and providing for her education. The day of her emancipation is dawning, but Robert Speer says, "The non-Christian principles of class and sex inequality have ruled the whole world except where Christ has changed it."

4. THE DIVINE RIGHT OF CHILDHOOD.

In nothing does Christianity shine more resplendent by contrast than in its treatment of children and in its claims of natural right for them. When Jesus took the little ones in his arms and blessed them, he conferred upon childhood a benediction that has blessed it wherever his gospel has carried the good tidings of his emancipatory message. Heathenism is condemned by no one thing more than by its insensibility to human pain and the utter numbness of its sympathetic powers. In modern times, as in ancient, the rule of the pagan world is that the right of the father is supreme over the life of his offspring. The child is treated as the property of its parent, and its chance in life is bounded by his human interest in it. Under a culture that is so little characterized by the finer sentiments of humanity and that knows so little of charity, the rights of childhood can not be many. Sons have ever had the better chance in life, because of the selfish interests of the fathers. They have been privileged, not by any inherent rights of their own as human beings, but through the selfish

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concern of their fathers. Daughters have suffered the ignominy of being born females. In ancient times, as in modern, heathen parents valued them little if times were hard, or if luxury was great and their care a burden.

Quintillian said, "To kill a man is often held to be a crime, but to kill one's own children is sometimes considered a beautiful action among the Romans." In the midst of the city of Rome stood the Lactrian columns. At their feet children that were not wanted could be taken in the night, and to them came barterers in human flesh, to claim whatever their inhuman choice might prefer. Occasionally a childless woman might come to get consolation for her empty heart and take one of the exposed little ones to her motherly bosom; often men and women came to get for their households those whom they could make slaves or servants; more often the abandoned little ones fell into the maws of those inhuman beings who are willing to traffic in the flesh and blood of their kind and to rear children as they might cattle for lives of toil, or worse, that they might sell them into the shambles of shame. Those who placed them there knew what the results were to be, but they perhaps considered it better than the custom of strangling them to death with their own hands, or exposing them in the wilds for the beasts to prey upon. Most horrible of all it was not unknown for witches to seek their dead bodies that brains and vital parts might be used in their abominable incantations. Greece practiced what we have here noted of Rome. In neither country did a child have any standing before the law. Its life

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was utterly in its father's hand. Under the Stoics some gain was made in obtaining natural rights, and the gradual enlightenment that time brought ameliorated their fate in custom, but little was really gained until Christianity struck the hearts of men with compassion and began to find lodgement in legal enactment, through the codes of Constantine and Justinian. The former ordered that when children could not be supported at home they should be brought to the officials and supported from the treasury. What such support was worth may be judged by the like provision made in modern China, where it is said the filth and squalor of government provided asylums are indescribable and the death rate high, while it is pitiful to hear the wails of the little orphans, half cared for at the hands of an officary which knows no compassion beyond that imbibed from heathenism.

What was done by ancient heathenism is done by modern. There yet exists in China the towers into which parents could put their undesired little ones at night, and to which those who desired them for any purpose could come to obtain them. In famine times children are sold for a few shillings, and it is no uncommon sight to see the bodies of little girls exposed at the riverside. Infanticide is one of the most open and brazen of heathen customs. When in 1870 the registration of births was made compulsory in India, whole villages were found to have but one girl child to ten boys. In 1843 in one whole tribe not a female infant could be found. In whole provinces it was found that there was but one girl child to every six boys, and there are authorities who declare that to

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this day what can not be longer done in the open is done by stealth in innumerable cases. Poverty preys upon the bodies of children now as among the ancients, and poverty is one of the omnipresent phenomena of heathen lands. In the fourth century it reached the climax of its devastations in Rome, and all the laws of the empire were powerless to prevent the inherent paganism of the masses from practicing the olden horror. The same is true in modern India and China, and even more so among the untutored sons of barbarous lands.

Among some tribes of Africa children born otherwise than according to prescribed custom are immediately killed. Some kill all twins, and most tribes make way with deformed or unnatural babes. The ancients destroyed their defective babes, or even worse, allowed them to be mangled that they might be used for begging, just as we are told is done in modern pagan lands where there is no Christian law to forbid. Seneca said: "Monstrous offspring we destroy. It is not anger but reason to thus separate the useless from the sound." Among the Gallas of Africa the custom is to throw any first-born child that happens to be a girl into the woods to die. Among other tribes all twins are destroyed. In the South Seas the missionaries found the strangling of infants one of the commonest of customs. In other places all born in certain seasons were destroyed, and there is scarce a barbarous land where is not found the practice of destroying child life with impunity. Heathenism is stricken with a lack of pity and dominated by the brutality of the strong. Gibbon says, "The exposi-

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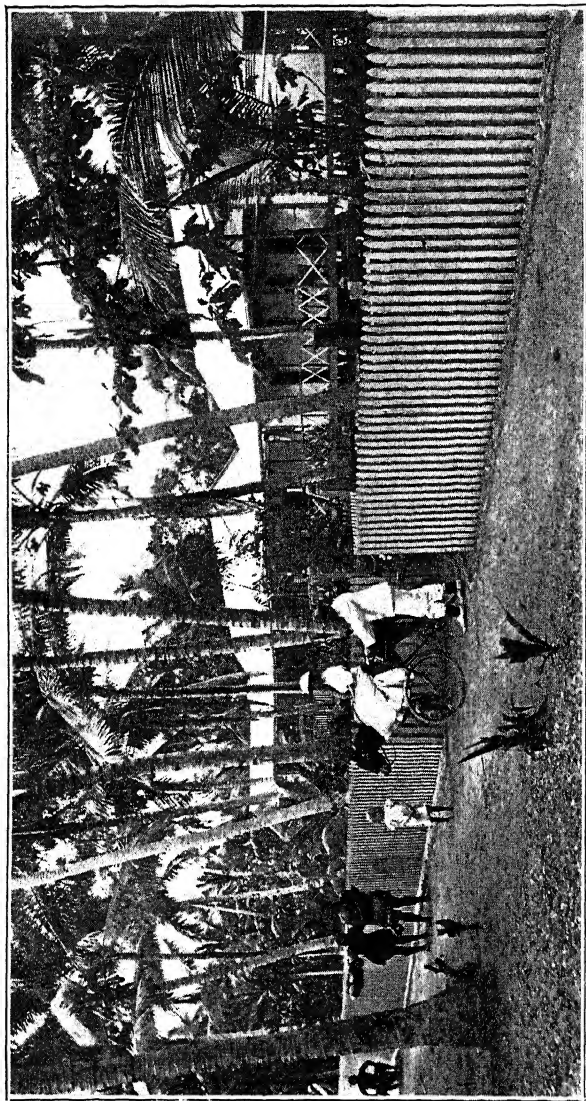
tion of children was the stubborn vice of antiquity." It prevailed down until the fourth century in Rome, and among the less tutored races of Europe until Christianity gained authority over their consciences. The sacrifice of children prevailed in Prussia until within a thousand years of our own time. It prevails until this day among peoples in a like stage of barbarism, wherever they may be on the earth. Christianity is the only religion that champions the rights of the little ones as their divine heritage. It is the only religion that holds their example up as a type of the better life and says, "A little child shall lead them." It alone provides orphanages for them and punishes crimes against their persons as against those of adults. That which heathenism makes their offense, *viz.*, their weakness, Christianity makes their defense, and provides extra precaution for their protection.

But it is not in matters of life and death alone, nor in the supreme authority of parents to barter and sell them that they suffer in non-Christian lands. It is a Chinese saying that there is a "pail of tears for every bound foot." The suffering entailed upon millions of little almond-eyed girls by that cruel custom can not be estimated. It was not sanctioned by Confucius, but is the social custom of centuries. To-day Anti-Foot Binding Societies are thriving in China. They were organized by missionary women and are fostered by statesmen who acknowledge their debt to the missionary. To have large feet in China is to be out of fashion and to suffer that cruel ostracism which Dame Fashion administers, even in Christian lands, with terrible severity. Few desire such girls

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in wedlock, and they are made a laughing stock and an object of jibes from their own sex. It will take time to uproot such a social custom, and no less a power than one that will, like Christianity, make it a matter of conscience can ever succeed. The pitiable case of the child widow in India was spoken of in a previous section of this chapter. Though the law now forbids the marriage of any child under the age of twelve, or before fourteen if protested, it is not enforced where native sentiment does not approve it.

The only relief for the child life of heathenism is the new valuation of life which Christianity brings. Even if the gross cruelties of sale and death are forbidden through a greater enlightenment, there will be no real emancipation until Christianity brings its divine right of childhood. In the midst of ancient society the church stood as the savior of child life. It forbade the exposure of little ones and made it a virtue to rescue them. It founded asylums and administered them for centuries before governments learned that the founding of such institutions were a part of their responsibility. In mission lands to-day the church does the same work. In famine times in India it has rescued its tens of thousands, and at all times has entered its note of protest against abhorrent custom. The supreme right of the father extended to maturity and beyond among the ancient pagans, just as it does to this day in modern China. He had the legal power of life and death and his will was supreme by the patriarchal law. It was not until Constantine wrote his code that the right to kill a son in punishment was denied, and not until in the days of



A Missionary Home in the Tropics. The architecture, sanitary surroundings, and garden cultivation are all models for the native community.

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the more Christian laws of Justinian that a son was given rights to his own property. China is yet living in that ancient era so far as legal rights are concerned, but she is receiving a vast leaven from Christian influences and will recast more law and custom within the next generation than Rome did in three centuries. The church was small in Rome, but she brings with her the mighty impact of a Christianized civilization to these modern nations and the race will be more quickly run.

5. THE MISSIONARY HOME A SOCIAL CENTER.

The missionary home is a sort of social settlement in the midst of the pagan community. The settlement idea is that of simply living and making a home in the midst of a neighborhood that has need of higher examples of living. The friendship of neighbors who will uplift and lend a helping hand is believed by settlement workers to be the primal means of effecting social good. They conceive of the home as being as much personal as institutional, and as the chiefest medium through which neighborly help can be extended. The settlement is a neighborhood house and to it all are welcome as friends, for through personal friendship religion reaches its most perfect social interpretation.

Some have said that the greatest single contribution of missions is that of the Christian home. If the home be the foundation-stone of order and progress in a civilization, and if non-Christian peoples are found to be most lacking in real home life, then the contribution of a model Christian home is, indeed, one of

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the chief contributions to be made to their social welfare and uplift. In it are found those exemplary characters which, however we may consider them as the most fundamental objects of Christian culture, are never made outside of association with other individuals, and whose virtues shine never so resplendently as in the intimacies of family life.

One missionary woman tells how she did her work through her home duties and preached without sermons through the medium of a quiet and home-like entertainment of her native neighbors. The door was ever open and the tea cup always ready. The housekeepers of the neighborhood were welcomed as friends, and sat them down for a friendly chat. Their familiar questions were her opportunities. They learned of the Christian ideals of home refinements and of sanitary housekeeping. She instructed them in the wifely arts of mending and fancy work and all manner of neat house wifery. Cooking came in for its share of talk, and many a lesson was given in hygienic preparation of foods. In these lessons, given through the natural interest of neighbors in her, to them, new and strange manner of living, she instructed them not to despise their own ways, but to add to them the universal needs of cleanliness, economy, harmony, beauty, neatness, and refinement. For it must be remembered that the missionary does not advocate the building of houses after the Western model, nor the changing of customs to agree with Western innovations, but only that the principles of better and more cleanly living be introduced

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into their ways, and that orderliness and sanitation be used in the practice of their native customs.

One of the curiosities of the missionary home to most of its neighbors is the honor and regard paid the wife by the husband, and the mutual life they live in their family relationships. Love is universally attractive. Peoples whose customs forbid any interchange of affection between husband and wife are attracted to the better way when they see it practiced by those whose probity they respect, and they come to comprehend that it is the way to a higher happiness. When husband and wife go abroad they walk side by side, while the pagan wife must ever keep to the rear, or go not at all when her husband goes; it excites comment and curiosity and not infrequently adverse criticism until it is better understood and more familiar to their eyes, but gradually it establishes a new regard for womankind, and in the course of time begins to break down the old and insidious practices of disrespect to which their wives have been accustomed from times immemorial. To lift one-half of humanity into the regard and social respect of the other half is a mighty achievement, and when that one-half is the motherhood of a race it is scarcely possible to measure its effects upon society.

The orderliness and refinement of the Christian home is usually in striking contrast to that of the lowly homes about it. In savage Africa houses are built low and small, without chimneys or windows, and the only means of entrance is through a low door that makes entering an acrobatic feat. Inside there is

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no furniture beyond a possible rude shelf or two, and a low bed of grass and mats. The floor is mud or the excreta of the herd, tramped hard with native feet, and the smoke of the fire fills the air as it seeks outlet through the thatched roof or open door. Inside there is anything but cleanliness, and the usual refinements of separating the sexes and providing for privacy, are unthought of. The patriarchal households of the more cultured peoples do not allow privacy, and the communal village life of the more barbarous tribes have never thought of it. In China and India the masses live, not in cities, nor in isolated farm-houses, as do Americans, nor yet in separate yards, as we do in our town life, but in small villages. Their streets are narrow alleyways or an unkept country road, and the small and unkempt houses are builded close against each other. The roofs are low, the street line irregular, the open spaces uncared for and full of filth. There is no regularity of outline in things, and everything bears the impress of disorder. Privacy is not maintained in separated family living. Every one knows every one else's business, and the chief diversion of the settlement is gossip. There is but one well, and to it both humans and animals repair indiscriminately. In India it may be a great tank or pool, and cattle and men alike frequent it for the quenching of thirst; all repair there for the provision of cooking water, the doing of the village washing, and to find a common center for the village life. The unspeakable sanitary conditions can be better imagined than described, and the appalling death rate that obtains among children needs little further explanation.

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In striking contrast, the village of the native Christian community stands as an illustration of how Christianity redeems the home life. It is not a paradise of beauty and refinement, but it is a vast improvement over the old manner of family life. The dwelling-places are cleaner and the children clothed with regard for modesty; the walls are upright and the roofs in better repair; the floors may still be of earth, but they are more cleanly, and modern conveniences are introduced with due regard to the meagerness of the native income; there is a more industrious type of life, especially among the barbarous peoples, for one of the things that Christianity takes to them is incentive to work, and a desire for more of the utensils of civilization. The heathen home is merely a place to get shelter. In tropical lands much of the cooking and most of the living is done out of doors, and in that is the best protection they have from their dwelling-places; otherwise all would surely be afflicted with disease, and death would be epidemic. In agricultural lands the animals usually live under the same roof with their owners; man and beast can not thus dwell together with aught but injury for the man. The native Christians may work at the same tasks, follow the same general customs, receive the same wage, and practice the same economic arts that they did in their old life, but they live more wholesomely in the midst of the old tasks and surroundings. Their children are clothed and their homes places of peace; their wages are kept for family purposes and never wasted on personal vices; their homes take on an angle of uprightness both within and without; the streets

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are cleaner and a more sanitary manner of life is followed; their wives are treated with kindness, and affection begins to root in their hearts where all too often there was none before; they love peace where before discord was the habit of their daily family intercourse; in fact, their home has taken the likeness of the missionary home, their village bears witness externally to the internal changes in their minds and hearts, and travelers say it is easy to tell the village where Christian influence predominates. It is a living testimony to the social value of missions. "It is refreshing to see the clean houses and villages of the Christians, instead of the filthy heathen hovels of previous years," said Dr. McKay.

In the mission home the family find their chief delight in the congenial converse of the table around the family hearthstone. The pagan family knows little of family counsel or mutual conversation about a family shrine, such as the missionary makes his board and hearth. Rarely does a Chinese child ever dine with both father and mother. The father is privileged over other members of the household, and the male members of the circle are accustomed to eating in the congenial company of their superior selves. The language of the heathen household is anything but pure and refined. Children learn talk that put the blush to men's faces, and the customary quarreling is carried from the house into the street. The father holds the scepter over both mother and children, and the mother-in-law over the wives of her sons. Arbitrariness is much more the rule than kindness, and the result is a bitterness in word and feeling

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and in mutual action that is liable to result in blows. Until this day instances are not unknown where parents have beaten children into insensibility and even sold them deliberately to be rid of them, or to purchase opium. The Christian home reproves this sort of a family life, and the benign example of Christian affection and peacefulness arouse in many hearts a longing for the better way. The men of the community come to respect the wife of the missionary because of her talents, for the interest she takes in their homes, and because they see her respected by her husband. Through the open channels of this regard for her, and through the undeniable argument of a greater happiness through it, many who before treated their women with scant regard or only conventional affection, come to open their hearts and overcome their ancient customs and accord her a real love, and to surround their children with a more refined and wholesome moral atmosphere. The tendency is well fixed, both in China and India, for the family to divide into its logical units and each married couple to have a separate dwelling-place and a division of income. Greater privacy is being guaranteed, and with it must come the more dignified manner of living and the cultivating of those personal virtues that arise from a greater sense of individuality and of personal rights.

Thus from the missionary's home radiate sermons from actions and an atmosphere that is conducive to social health. Its example is eloquent to the very human consciousness of its neighbors, and its exhortations, though mutely spoken, are more persuasive oftentime than an articulate message. To become a

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neighbor to a man is to fulfill the law of service toward him. In the Christian home are the head waters of all that fructifies the rich fields of civilization, and no greater judgment of failure could be pronounced upon a society than to say, as has been said of heathenism, that it has no homes. Ten thousand missionary homes are bearing their witness on the mission field, and the social benefits that flow from that witness are mightier than words can tell; there is no statistic that is able to enumerate the unbounded good they are bringing to the new civilizations that spring up wherever they are founded.

CHAPTER III

Benevolence: The Heart of Social Progress

1. THE EVANGEL OF HUMANITY.

Benevolence is the heart of social progress. It is through the expanding circles of sympathy that civilization evolves. The primitive man is selfish; it is his kinship to the brute. Sympathy is all but unknown to him except as it reacts very directly upon his own welfare. But mother love softens the heart of the rudest, and its expansion into family affection widens the circle of sympathy and broadens unselfishness; it is nature's first instinct of sacrifice. Mother love expands into brother love. The interwoven interests of family merge into those of tribe, clan, neighborhood, and nation, and finally become universal. Every stage of civilization manifests some measure of this larger bond of common interest. China is to-day no farther advanced than was the world to which the first missionaries went. Africa is but at the dawn of human evolution, if indeed it be not a decadent continent of people. Paton, Hunt, Geddie, Williams, and their compeers found humanity in the South Pacific Seas almost devoid of the instinct of sympathy. Japan had evolved a paternalistic type of society, and cared for the suffering with more effectiveness

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than any other pagan nation. In the change from the old to the new, the old system was overthrown and the new^{*} is being established, substituting national for the feudal care of the dependent. The Chinese, says Arthur Smith, "display an indifference to the suffering of others which is probably not to be matched in any other civilized country." They have never evolved more than a family type of sympathy, except where they have come into contact with Christianity. Their naturally fine capacity as a people quickly yields to those higher compassions that are native to their nature but have never been cultivated. In India the caste to which one belongs is alone responsible for him. There are fifty millions of low caste and out-caste peoples who have no one to care for them. Paganism has no deep sympathies and the circles of human responsibility are small. Neither their governments nor their religions furnish such a thing as real philanthropy. Old Rome fed thousands at the public granaries, but there was no organized charity; it was more an act of political expediency than of public benevolence. In many Oriental cities, including the Mohammedan, there are small institutions supported by subscription from the rich, but they are few in number and so poorly managed that they count for little. Even in Japan the amount of public relief is less than one hundredth as much per capita as it is in America, and the need is many times as great. The mark of progress in civilization is the breadth of its interests. The "struggle for self" gives over increasingly to the "struggle for others." Pagan Rome grew great by the growth of imperialism and

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by the creation of a few great through their power over the exploited many; but its luxury and heartlessness were its ruin. In the fourth century poverty was perhaps the greatest it has ever been in Western civilization. In the midst of it all Christianity grew up with marvelous rapidity through its benevolence and its appeal to the common man. Rome apotheosized wealth and power; Christianity worshiped a Carpenter who had "not where to lay his head." Rome's divinity was a luxurious and dissipated Caesar; Christianity's was a pure and humble Nazarene. Rome subdued a world by force of arms; Christianity by the force of brotherly love.

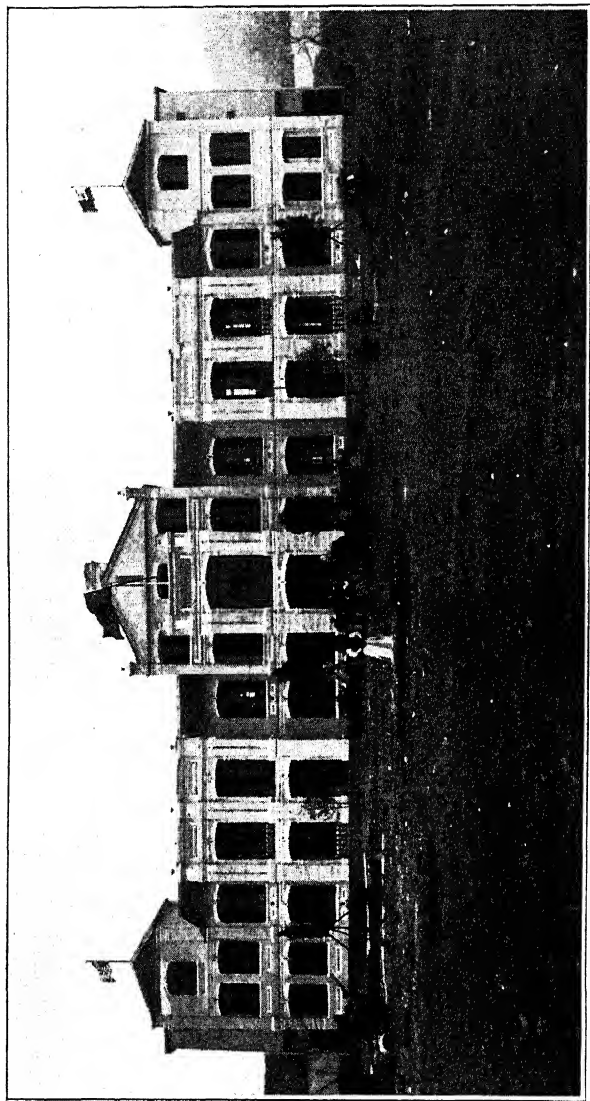
The non-Christian world is poverty-stricken. The Hon. Chester Holcomb said that if modern American almshouses were to be erected in China and thrown open to all who would come, two-thirds of the population would be at their doors, because what they would receive there would be so much better than what they live on all their lives. Bishop Thoburn says that one-fourth of the Hindu people live without enough to nourish their bodies properly, and that millions are always on the borderland of starvation. The wages of the common laborer in all these countries will average less than one-tenth that of the same toiler in our own land. In India men work for from six to twelve cents per day, and women at from three to four. In Japan wages are not more than twice as much, and in China they are no better; servants will work for three or four dollars per month and support themselves. The average for school teachers is but from fifty to sixty dollars per annum. It is

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not enough to say that living is cheap. It is not cheap living, but a low standard of living that makes life at all possible to ninety per cent of the people of the pagan world. In three thousand years of civilization, Japan, India, and China evolved no standard of living that gave them title to human prosperity, and the standard of living is the mark of economic progress; upon it hangs the possibility of all other progress; it is the base line of civilization.

Where there is so little margin for a livelihood there is great suffering when famine comes. In the seventies no less than ten million died in the Chinese famine. India made little progress in population until England stopped the awful devastations of death that came with her drouths, by building irrigating ditches and providing public relief works and teaching the farmers how to conserve their lands; in one famine she spent no less than thirty million dollars in relief. Neither India nor China ever made any preparation to meet nor any adequate effort to relieve these awful holocausts of death. "There are millions more," said a Chinese official when his sympathy was asked for these famine sufferers; he was an untutored Malthusian. In India one province suffers while another has plenty, but there is no connection established between the granaries of the prosperous district and the lazar house of the famine ridden, except as Christian charity brings the price.

Buddhist priests are to-day making some agitation for charity in the name of Gautama. Like Julian, the apostate emperor, they rally their coreligionists with the cry, "It is a scandal that the Galileans should



Hospital at Hanyang, China. It illustrates the commodiousness and modern type of the best class of missionary institutions.

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support the destitute, not only of their own religion, but of ours." The Brahmans care for the sacred cow, but they do not erect homes for orphans or asylums for lepers. Christianity cares for a million each year in the very midst of these pagan faiths. In India alone it has eight thousand orphan and famine children in its homes and industrial schools. Where the pagan religions do any charity it is for the purpose of obtaining merit. Brahmanism denies the privilege of erecting institutions because the merit is in the secrecy of the gift; thus a very small coin to the beggar or a bowl of rice to the fakir suffices. Lecky says Christianity's power as a civilizing factor has been in its "capacity for producing a disinterested enthusiasm." He says the Christian religion has "done more to quicken the affections of mankind, to promote pity, to create a pure and merciful ideal, than any other influence that ever acted upon the world." It has ever appealed to the poor and needy and dispossessed of the earth, and from them has created the rulers of the next age. Its famine children go from their schools to create a new type of home and industry, and to lead with a new and benign intelligence in the common affairs of their fellows. It lights the fires of sympathy in humble hearts and the contagion spreads from their humble habitations into the hearts and homes of their neighbors, and the old customs of cruelty, callousness, and superstition are displaced in society. In the South Seas men who once would have robbed and eaten the shipwrecked, have been known to rescue and succor them. In Dark Africa tribes that were ever at war have carried relief to one another

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in time of distress. In the far North peoples who once killed their aged have come to care for them tenderly. Wherever the missionary goes he lights the beacon fires for the distressed and suffering, and offers them hope in the name of the Christ who healed the sick, cleansed the lepers, blessed the children, befriended womankind, and preached good tidings to the poor.

There are some practices of heathenism that are almost too cruel and revolting to seem possible. Cannibalism is yet practiced in parts of Africa, in New Guinea, and in several islands of Micronesia. The aborigines of Australia were found indulging the horrible practice as late as 1896. In many places pioneer missionaries have lived to see cannibal chieftains die Christian. One young worldling visited in the South Seas, carrying with him a blasé sneer for the missionary. He was shown a hollow tree, enclosing a heap of several hundred stones, and told by his native guide that each one represented a human body that had been served before the late chieftain, and that but for the missionary one would represent him there on the morrow. Paton, Geddie, Hunt, Chalmers, and many others wrought new creations among cannibal peoples and transformed places of such unspeakable savagery into islands of peace. The Fijians contributed liberally to one of the late Indian famines, and are to-day the best church goers in the world, unless it be, perhaps, the slave-hunting tribes of Uganda, whom Mackay and his successors converted into disciples of brotherly love. Holcombe tells of the horrible manner in which the people of Peking disposed of their dead babies. They cared for them

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until hope grew faint. They then placed them upon the door step and awaited the issue; if they died they were accounted no children of theirs; in the early mornings a great wagon made the rounds, gathering up the little bodies, and they were sent away without funeral or tear. In parts of Africa the lepers are killed. The Esquimaux of Alaska were found making a holiday out of the killing of their aged. The beggars of Chinese cities are carted out for the dogs to eat, or left where they die. Many Hindus carry their dying out of the house as soon as death seems imminent, and if possible, carry them to the banks of the sacred Ganges to gasp out their expiring moments. It is a common custom to begin funeral preparations before life is gone. Paganism lacks the finer sentiments even where it does not possess the most gross. Its circle of sympathy is small. Christianity takes to it the message of universal brotherhood and gives it a heart for humanity.

2. CLINICAL CHRISTIANITY.

"All missionary work, in the highest sense, must be healing work," said the indomitable Mackay of Uganda. Mackay used medicine, industrial training, carpentry, diplomatic advice, and all other means that opportunity offered to break his way into the confidences of M'tesa and overcome the frightful cruelties of that cruel chieftain's slave traffic, and the even more frightful superstitions that made all other evils possible. After a lifetime in Africa the great Frenchman, Coillard, wished he had another life that he might study medicine and spend it in the

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Dark Continent, opening fastened doors, and, like Livingstone before him, probe roads of healing into the open sores of Africa's savagery.

The new physiology makes the body sacred, even as Christ did when he declared it to be the temple of the Spirit. The new psychology knits mind and body up together in such manner as to make consideration of one impossible without a knowledge of the other. The new ethics demands the sacredness of the flesh as a means to the holiness of the soul, and our understanding of Christianity, in these latter days, leads us to see that there is not only no antagonism between spirit and body, but that there is a divine relationship. Asceticism revolted against the frightful immoralities of base paganism and swung to the extreme of despising the body, but we find that not emaciation but emancipation is the true way of life. Thus we seek, religiously, to free ourselves of disease and to live a clean and wholesome life, and we find in good hygiene one of the ways to upright living.

Jesus healed as he preached. Indeed, there is as much emphasis given in the synoptic gospels to his healing as to his preaching. The deaf, blind, dumb, lame, fevered, epileptic, insane, all received his merciful ministrations. He sought out the suffering and the suffering sought out him. Multitudes brought of their sick that he might touch them and make them well. His great-hearted sympathy went out in compassion in the divine ministry of destroying pain. It was his care for the suffering of bodily ills that made him known above all as the man of compassion. That greatest of all encomiums pronounced upon him, de-

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scribing him as one who went about doing good, was due to his ministry to pain. One of his most used, because most significant titles, that of the Great Physician, comes from his cure of physical ills. He never conceived of his gospel being preached without ministration to the physical needs of the poor and suffering. When he sent out his disciples for their itineraries, he told them to go healing and preaching.

The masses of men live very much in their physical beings. Not many are able to arise above pain and become saints and poets in spite of it. It is difficult to be both a sufferer and a saint, or to be poor and practice the refinements of Christianity. That it is possible is unanswerable testimony to the spiritual power of a true faith, but Christ did not intend that poverty and suffering were to be made cardinal means to righteousness. He intended rather that through the relief of them Christianity should take the world. The great world of paganism is a world of ignorance and of spiritual numbness. It lives in the flesh, and finds its first revelations most easily by relief of its pains. "If we want," says Dr. Arthur Lankaster, "to write the teaching of our Lord Jesus Christ in very large letters, so that those who can not read theology and do not understand science or philosophy can read it very easily, the best way of doing it, whether it be for an individual, a village, a town, a district, or a nation, is to start medical aid for the poor." "He is not from America, he is from heaven," said the astonished Korean courtiers when Dr. Allen stopped the wounds of their dying crown prince. It was a sermon without words, but a thousand times more

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eloquent to their ears than could any have been in words. To-day all Korea is listening to the words of the evangelists. He may throw our proffered Bible aside, said Dr. Williamson, our civilization make him all the more a materialist, and we may be unable to convince him that we are not preaching for the sake of the salary, but heal his disease and ease his suffering and he is eternally grateful, and through his friendship for you will learn of that greater friend. Science can be cold and heartless in its quest of mere knowledge, but science, set on fire with compassion for men, is one of God's means of revealing himself to those who are dumb to all other appeals.

Medicine takes a new humanitarianism to the peoples who have not known the sacred art of sympathy. The Hindu religion will lead its devotees to swing themselves by hooks in the back, or sit for days on beds of spikes, or to spend \$50,000 on the wedding of a pair of sacred monkeys,* but it never built a hospital. "In all my classical reading," said Professor Packard, "I never met with the idea of an infirmary or hospital, except for sick cats in Egypt." Certain sects of Hindu devotees will not sit down without first brushing the earth lest they destroy some insect life, villages will see their children die by serpent and tiger and refuse to kill the beast because its life is sacred, but women suffer untold miseries when children are born, little ones starve by the tens of thousands in famine times, beggars perish and rot by the wayside, for their faith has taught them no such ideas of the value of a human life as to lead them to organize charities, or build asylums, or create systematic forms of

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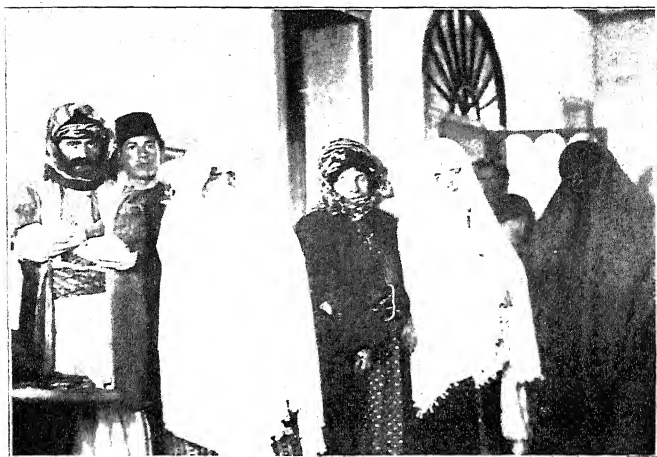
relief. Multitudes suffer from preventable disease, but there is no adequate art devised for their healing, and even such physicians as they have will refuse them aid because they are too poor to pay. Medicine, in the hands of a missionary, opens to them new visions of the sacredness of life itself. The native Christians will care for the poorest and the foulest of their fellow-men, where before they would have passed them by with no thought, or mayhap joined the crowd in jibes at their sad predicament. It was no different among the ancient pagans. "Among the millionaires of Rome there was not one who founded a hospice for the poor or a hospital for the sick," said Dr. Dollinger. They had culture and philosophy and art, but they had no adequate humanity. Their lives were ordered from the standpoint of selfishness. The most learned, and those who speculated profoundly about the soul and its future, could, with no pang, consign the multitudes to a place beside animals and argue that they were born to be slaves—men who, by their very nature, could never realize on a human inheritance.

Of modern religions the most compassionate is Buddhism. There is record of a Buddhist hospital three hundred years before Christ, but that religion is so profoundly individualistic that it soon lost all power for real charity. Its main sanction was that of merit for self, and until men forgot self and self's reward they are never of great value to benevolence. From the first Christianity practiced a self-forgetful charity, and began to build institutions for the public care of the sick by the end of the first thousand years of its

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history. Before that they had received care in monasteries and at private hands, and the law had taken account of them from the time it began to take account of Christian principles. It is under Christian governments that philanthropic institutions are builded to-day, and those of Japan and the few instances in China are due to Christianity's having come to teach the way.

Dr. Gulick quotes a noted Japanese of the era of the first Catholic missions in that land as saying that "people contribute to the temple, but never before was it heard that a temple contributed to the help of the people." Medicine takes a new conception of religion in its enforcement of the missionary, and reduces the precept to example in a manner that can not be misunderstood by the most ignorant and prejudiced of superstitious minds. "Missionary medicine has not exhausted its influence when it has healed the sick one," says Dr. Williamson in his excellent little volume on "The Healing of the Nations;" "it reaches round and exerts its power on a larger world than that gathered in the hospital waiting room. It pioneers education; it stimulates scientific methods; it inculcates sanitary principles and introduces plague precautions and deals with epidemics. Again and again it becomes of political importance; its weight is thrown on the side of benevolent undertakings, while all the time it is raising in estimation the value of human life and the sacredness of womanhood. These are stars of the first magnitude which shine brightly in the firmament of Christian Sociology." The itinerary of the medical missionary resembles the evangelistic journeys of the



Koords, Syrians, and Moslems in a Missionary Clinic. Illustrates the manner in which Christian benevolence breaks down prejudice.



A Chinese orphan girl before and after treatment in a missionary hospital. This is a parable of Christian benevolence on the mission field.

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Great Physician. Men come miles to meet him and his roadway is the scene of many pitiful appeals; he touches one here and another there and leaves his healing balm in a hundred hands every day; he healeth their diseases and to every one gives the greater prescription for the cure of the soul. His dispensary and hospital waiting-room are like the evenings at the lakeside in Galilee, where the multitudes brought their sick and afflicted that the Great Physician might touch them. There come the rich and poor to mingle side by side, for a great need doth make brothers of them all, and all receive, that through the healing of their bodies their souls may be freed.

3. THE DEVASTATIONS OF IGNORANCE.

There is no science of medicine in the non-Christian world. In savage lands, and often in the Orient, the profession is mingled with the black arts and the profession of witchery. In Africa it is in the hands of women who deal in charlatanry, or of the medicine man, who is adept in magic and generally the greatest fraud and scoundrel in the tribe. He "smells" out the trouble with all due ceremony and locates it in the ill will of some enemy or the displeasure of some spirit. His cure is one of propitiation for the offended spirit, or of "ordeal" for the enemy who has done bewitching. "Evil eye" is the fertile cause of many of the diseases of superstition. It hedges life around with unending regulation, and makes living a terror. It indicts many an innocent person with the crime of bewitching and is the source of untold enmity and of punishment that is undeserved. In China the phy-

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sicians have many simple herbal remedies that observation has taught them to be useful, but they are so mixed with the rites of superstition, or the prescriptions of a credulous ignorance, that they are largely deprived of their virtue in actual practice. All ignorance is dangerous, but nowhere does it bring more direct suffering than in the practice of medicine. A lady physician in Persia tells of seeing a native quack burn open the frontal fissure in the head of an infant that the evil spirit might escape. Another in Korea tells of seeing a native practitioner burn heaps of brown powder on the breast of a child and follow it by thrusting a large needle through each foot, the palms of the hands, the thumb joints, the lips, and then beneath the nose. A doctor in India tells of a mother who brought a child to him for treatment of the eyes, saying she had faithfully followed the prescription every day for two months; it was to put a powder of charcoal and donkey's tooth into the eye. For supuration it is customary to daub tar or some other adhesive over the place where the puss should exude; the agony that follows can well be imagined. One Chinese cure for hysteria is to put bugs up the nose of the victim. Rheumatism is often treated by cutting a gash over the aching joint and rubbing cayenne pepper into the wound, which is then bound up. The native Chinese quack will thrust a long, rusty needle into the affected part, to allow the evil spirit to escape and then burn the wound to heal it. The liver is looked upon as the source of many ills and the people are much given to stomach trouble; both organs as

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well as the lungs receive the wicked needle when affected. Gongs are beaten to drive away the demons, and the most hideous noises are raised where good treatment demands quiet. Many crowd around and touch with their filthy hands and clothes, when isolation is demanded by aseptic necessity. Dr. Keeler, of Changli, tells of one man who came to him with four hundred punctures of the Chinese needle in the spine and thighs. Hindu mothers will be confined to a dirty hut for days after the birth of their children and compelled to go without either food or water, and then be given a cold bath. One Chinaman had tried to cure dyspepsia by a two years' course of drinking daily a cup of ground stone and water; he had taken forty pounds off a grindstone, but was uncured. It is not simply the suffering that is uncured, but that which is caused in the use of ignorance and superstition, that cries out for a scientific medical profession in pagan lands.

The native practitioner has no education for his work and is quite as liable to be the most ignorant and unsuccessful man of the community as any other. There is no knowledge of anatomy and little of *materia medica*. Dissection is unheard of and would be looked upon with horror in the Orient. The Chinese believe there are five tubes leading from the mouth to the stomach, and that both lungs are on one side. The Hindus say there are nine hundred bones in the human body. There is no adequate diagnosis; it is largely a matter of guess work or of an attempt to locate the demon. Their prescriptions are fearfully and wonder-

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fully made. Here is a sample as reported by a missionary physician:

Powdered snake.....	2 parts
Wasps and their nests.....	1 part
Centipedes.....	6 parts
Scorpions.....	4 parts
Toads.....	20 parts
Grind thoroughly, mix with honey, and make into pills.	

Dose, two to be taken four times a day.

Tiger's bones are a sovereign remedy for weakness and for cowardice, because the tiger is strong and brave. Bugs, beetles, flies, bats, and lizards are common remedies. In extreme cases in China the flesh of a son or daughter has been prescribed; it would be good for the child as well as the parent, for it would thereby learn filial obedience. In savage lands charms are used, drums beaten, horns blown, and various devices resorted to for the overcoming of the demon. Some of the blood of the patient may be extracted and given to an animal that he may carry the spirit away and get the benefit of its residence. It may be hoodooed into the anatomy of some special enemy, or it may be extracted by the legerdemain of the medicine man and held up to the view of wondering relatives in the form of a bug or snake or some small varmint which he has deftly extracted from his sleeve.

The death-rate of children is appalling in lands that have no scientific medicament. The rate for little ones of one year and under is twice as great in Calcutta as it is in London; Calcutta is one of the most

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modern of Oriental cities and London one of the most congested of those in the Occident. The normal death-rate for non-Christian lands is twice that of Christian countries. It would be much worse but for the habit semi-barbarous peoples have of living out of doors. In Asia the masses drink hot tea to the exclusion of water to such an extent that they are saved from the ravages of the germ-laden streams and ponds to which the majority repair for use of kitchen and washtub.

Smallpox has decimated islands in the South Seas and taken one-half the populations in Oriental communities; it was thought to be the devastation of demons; one-half the deaths in Korea are through it. The United States has banished it from its realm, so far as epidemics are concerned, by the use of vaccination, and our physicians fear measles more than they do the once dreaded scourge of smallpox; but it destroys with all its terrors where cleanliness is not a virtue and there is no knowledge of the nature of disease and its transmitting qualities. In the city of Canton the population seems to be a pox-marked people, as if it were a racial peculiarity. One meets the disease in all its forms on the street in mid-day. The even more terrible scourges of cholera and the bubonic plague have worked their way unhindered until in very recent years, and the measures taken now are the result of the work of the medical missionary, except perhaps in the case of India. "How is it that you Christians do not take the plague?" said an intelligent Chinaman, "we have had processions and fire-crackers, and made presents to our gods, but all

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in vain; we are dying by the hundreds." A village in India recently filled the trees about its environs with the bodies of decapitated dogs, that the spirits might be frightened away as they came to bring the plague. In Tibet the heroic expedient of burning the poor first victims of smallpox is sometimes resorted to. Cholera is one of the most easily avoided of epidemics. It can be conveyed only through a very specific contamination, and one that endangers no one where every one is cleanly. Dr. Osgood says that 60% of the diseases the medical missionary meets are those due to uncleanness. There is no knowledge of sanitation nor of disease germs. An Oriental city smells with the seventy-odd smells Coleridge found in old Cologne. The nasal organs of the East are benumbed. Sewage is dumped in the street and left for dogs to eat. Stagnant water stands before houses and in village streets. Drainage is unknown except where civilization has first gone. Light is not one of the household commodities and fresh air is not prized for its own sake. A medical missionary in Persia says that his patients fear both open windows and light. Mecca is a menace to all India and Eastern Asia; contagion spreads from almost every pilgrimage. The pilgrims are filthy and huddle in crowded quarters while in the sacred city. Whatever happens is by the will of Allah, and precautions are scorned. The *Lancet* gives an incident that illustrates the attitude of a Moslem mind toward hygienic regulations. The French Government desired to obtain certain information about Moslem cities for the use of its colonial office. The following questions were sent to the

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ruling Pasha of Damascus, and the answers here given were returned: .

"What is the death-rate per thousand in your principal city?"

Ans. "In Damascus it is the will of Allah that all should die; some die old, some die young."

"Are the supplies of drinking water sufficient and of good quality?"

Ans. "From the remotest period no one has died of thirst."

"Make general remarks on the hygienic condition of your city."

Ans. "Since Allah sent us Mohammed, his prophet, to purge the world with fire and sword, there has been a vast improvement. And now, my lamb of the West, cease your questioning. Man should not bother himself about matters that concern only God."

Perhaps no tragedy of ignorance is greater than that of the lepers and the insane among non-scientific peoples. As in Biblical times, the insane are looked upon as possessed with demons and are turned out to wander; they are shunned as were the lepers who had to cry, "unclean, unclean," at the approach of any one. Cases are known of them being walled up until death brought release. Violent cases are bound down and left with an occasional morsel. Refractory ones are beaten, and the custom generally is to accord them brutal treatment. On the other hand, some peoples look upon them as inspired. Demon worshipers stand in awe of them, and their sayings are regarded

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as divinations. In all the non-Christian world there is no record of a single infirmary for their protection or cure, except as the missionary gives it. Lepers meet a universal fate of isolation, with no hope, especially after the disease is marked or known by others. It may be hidden by the poor victim until he has inoculated many others, for leprosy, like many other transmittable diseases, is infectious rather than contagious.

Blindness is one of the most universal ills of pagan lands. There are a million blind in India and China alone. Little babes are bound to the back or over the hip of the mother or a little sister, and carried about with their tender eyes exposed to the tropical sun. Uncleanliness is the prolific source of blindness as of all other diseases. The habit of having the barber cleanse the eyes is, in China, the source of much trouble, for he wipes the tender organ with his dirty and contaminated apron. Again, lack of precaution spreads the maladies. Necrosis of the feet, through foot-binding, causes untold agonies among China's girls. Suffering of all kinds drives multitudes to the relief that opium can give. The deadly pipe habit is growing rapidly in India. There are numerous other specific ills that space does not allow named, but whose presence, and the devastation they wreak, can be laid up to habits of uncleanness and to ignorance of the nature of disease. Paganism has many diseases, but no adequate remedies for them. It has a penury as great as its other suffering, but it has neither hospital, scientific medicine, nor a charity that seeks the things of others as one's own.

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4. ONE MULTIPLIED BY A THOUSAND.

In China there is but one scientific physician to every million souls. In the United States there is one to every six hundred. If there were but two doctors in Chicago, and one in St. Louis, we would have some idea of the needs of China and of the stupendousness of the medical missionary's work. In all paganism there is only one trained physician to every two and one-half million people. The average number of people within the radius of a mission station is probably twenty-five thousand. There are eight hundred medical missionaries. Thus they are able to reach in some adequate way about twenty million people. Their work spreads far beyond their stations, however. Patients have come journeys of weeks to receive healing. When Dr. Dye went to the Congo there was not another physician in a radius of eight hundred miles of Bolenge. Men came four hundred miles to his clinic. It is no uncommon thing for them to come from one hundred to one hundred and fifty miles. In China many instances are cited of them wheeling a member of the family a week's journey in the native barrow that they might get the benefit of a surgical operation. Three million patients are treated annually in the eleven hundred hospitals and dispensaries. A day's treatments will often include from one hundred to two hundred patients. One blind man who was cured went home and sent twelve blind neighbors to the physician. They came as of old, one leading the other. Another put twenty into a boat and had them taken to his benefactor. Every man helped

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becomes an emissary of healing. The benevolence of the mission station reaches out for vast distances, and everywhere it goes it strikes a blow at the superstition of demon worship and the black ignorance of the natives.

The work done by some single medical missionaries and at certain hospitals all but defies credulity. The greatest practitioners and the most adequately equipped of the great hospitals at home do not equal it. In fifteen years Dr. Elizabeth Reifsnyder, of Shanghai, ministered to more than 200,000 patients. Dr. Butchart, of Lu Cheo Fu, is at present administering 35,000 treatments annually. Dr. John Kerr, of Canton, attended over 700,000 individuals in his work as a good physician in China, and performed 40,000 operations. The two hospitals in Canton give 112,000 treatments annually. In Swatow one missionary hospital receives into its beds 25,000 sick each year. The two Canton institutions have ministered to more than 1,250,000 persons since their establishment. But figures do not tell the story; they must be touched with imagination to convey any adequate picture of the work really done. One must see the long journeys by foot, boat, barrow, and mule-back to get to the missionary station, and think of the suffering endured under these primitive means of locomotion. He must picture the long and painful treatment endured often at the hands of the native quack before enough light reaches the poor sufferer to permit his prejudice, or that of his relatives, to send him to the foreigner. He must paint the scene in the waiting-room, the ulcerated limbs, the great tumors, the swollen bodies,

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the blind eyes, the wan and ghastly yellow faces, the torture of little children, the patient suffering of aged women whose whole life has been one of such hardship that pain no longer puzzles them. There the rich sit in their silks by the side of the beggar in his rags, and all look with the one human hope to the door into which they will soon enter, half in fear, half in awe, for the doctor seems to many of them to be a miracle worker.

But the medical man's work is not told even in the stupendous work he does with the multitudes that seek him, once he has won his way through the maze and mire of superstition. He goes into the broader field of social welfare and grapples with questions of sanitation, hygiene, and the establishment of governmental institutions for doing the work he is able only to begin doing. Dr. Berry taught a class of one hundred and twenty young men while doing the work of a strenuous medical missionary in Japan. Dr. Hepburn was the founder of medical science in Japan, and added to his missionary labors, not only instruction for a future profession in the empire, but every form of philanthropic effort, and was decorated by the Mikado for his gifts to the social welfare of the nascent nation. Dr. Mackenzie founded the first medical school in China, at Tientsin. The mother of Li Hung Chang gave him the first thousand dollars ever given by a native for Christian effort. The famous viceroy himself aided in all Mackenzie's work. The college is to-day under native auspices and the pioneer missionary's pupils are on its staff. The first lesson of the native doctor is to learn the location of the two

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hundred places where punctures may be made with his long needle, without killing. In the modern missionary medical school he learns to perform surgical operations with skill. Japanese surgeons are among the famous operators of the world to-day, and China's will be in another generation. Dr. Tenny tells of thirty-two medical schools under missionary auspices. As in Japan, so it will soon be in China, the missionary will have established the idea of a scientific medical profession, and the nation will adequately endow its own schools for the training of a native profession in modern medicine and surgery.

The medical missionary writes pamphlets and books for public instruction and scatters them broadcast. His field is wide for this kind of work, for the ills of the land are more than one-half preventable by ordinary cleanliness and hygienic living. He studies climatic and other diseases peculiar to his chosen field, and thus adds to the sum total of medical knowledge. He learns the pharmacopœia of his district, that the people may have the benefit of cheaper medicines and the world the benefit of any discoveries that may be made. He prepares the public mind for dealing with epidemics and plagues, by lecturing and writing on ways to prevent them and means for dealing with them when they come. Governments listen to this instruction on such matters, and his power is multiplied by thousands. He establishes plague-camps and isolates all who will submit, that they may not be a menace to others, and may get the cure that pure air, water, and food will bring, together with his treatments. In Kashmir one physician sent the

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school boys out with tracts when the plague threatened, and they were purchased and heeded by hundreds. He introduces vaccination and has persuaded the government of Siam, through its enlightened late ruler, Chulalongkorn, to make it compulsory; to-day every child in Siam and Laos is vaccinated just as he is in America. One missionary station cared for more than 10,000, and Drs. Adamson and Braddock, of the Baptist Mission, superintended the vaccination of 200,000 in one year. He introduces modern surgical instruments, and many of the better native doctors learn both to use them for simple operations and to adopt his simpler remedies in their practice. Antiseptics, anesthetics, clinical thermometers, the art of nursing, and instruments for a more scientific diagnosis are all contributed by him to the better care and cure of the multitudes who are tortured with many irritating little ills due to their unhygienic living, and by many major evils that grow out of neglect or malpractice. In the late plague in China he induced the authorities to establish quarantines, and made inoculations that helped to get control of the situation. He convinces authorities of the benefits of the disinfectant and the necessity of the sewer, and in every way multiplies his force by enlisting newly enlightened public sentiment. Such work is a task of a lifetime, but once done, it is done forever.

The medical missionary is no longer needed in Japan, except as he is needed in our city slums and among the poor. In another generation or two this will be true of China and every land that has begun in earnest the work of public education. It was a

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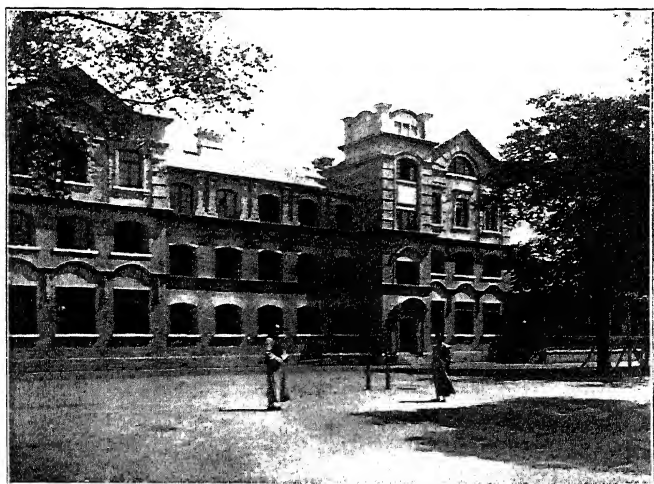
millennium before the church received the help of governments in the tasks of social welfare, such as equipping hospitals, the care of the poor, the building of asylums, and the instruction of the youth. She must yet do much of it, but the more rapidly society takes over the task, the better is the work of the church done in bringing in the Kingdom of God. The governments in mission fields have the example of those of Christendom and will move more rapidly. Japan is in the lead, but there is no adequate institutional equipment there yet. China is beginning such work, and her statesmen acknowledge the debt of the nation to the missionary for showing them the way. Dr. John Kerr established the first infirmary for the insane in all China within the last decade. Dr. Berry is the father of prison reform in Japan; it is woefully inadequate yet, but the work of native Christians, like Haro, Ito, Tomeoka, and Oinue, has done much. Dr. Murray established the first school for the blind in China; his work is duplicated by several other missions to-day, but there is little by any but the Christians. In India, with its two hundred years of white rule, only one in twenty is yet reached by scientific medicine. Something more is needed than external rule. The missionary furnishes the desire and arouses the discontent. The teacher is more powerful than the ruler.

5. CONQUEST AT THE POINT OF THE LANCET.

"China was opened to the gospel at the point of the lancet," said the pioneer, Dr. Peter Parker. "A cure, to their eyes, is the proof of our apostleship," said the veteran Coillard. Dr. Allen was denied op-



Native Medical Staff, Union Medical College, Peking. Illustrates the making of a native medical profession.



Dormitory, Union Medical College, Peking. Illustrates Christian union in the social work of missions.

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portunities to work for Korea until, when the crown prince had been wounded in a street riot, and the native physicians had failed to stop the flowing blood by stuffing in wax, he was called on as a last resort. He soon mended the torn artery, and from that day was given free scope for his work of healing both body and soul. After Dr. Mackenzie had cured the wife of Li Hung Chang, the port of Tientsin was open to the gospel, and the great viceroy became the friend of Christian benevolence. Dr. Livingstone probed his way through Africa, and was known far and wide in the heart of the Dark Continent as a miracle worker. Dr. Carr won his way into Persia when all others had been denied entrance. Kashmir was a closed land until Dr. Elmslie opened it at the point of his lancet. The story could be repeated on a hundred fields. "The greatest discoveries made in Africa were the roads to the hearts and confidences of the people," said Henry M. Stanley. The medical missionary touches them where they can understand. They know of their physical wounds and diseases, but are often benumbed and unconscious of their moral troubles. The missionary's benevolence in dispensary, hospital, orphanage, school, and by personal friendship not only interprets to them the real heart of the religion of Jesus, but makes them "potent forces, which are to-day influencing and winning the millions of the Far East to the realities and beneficent blessings of a new life," says Wm. Remfry Hunt in "Heathenism Under the Searchlight." John W. Foster, ex-Secretary of State, and noted diplomat, found in surgery "a ready means of overcoming prejudice and opposition."

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Opium smokers have been rescued to become effective workers. It is not easy to cure the opium habit. It is said that some of the older officials of China died in their efforts to obey the anti-opium edict. The physicians say that cures are seldom permanent if there be not a mighty purpose in the heart, such as only religion can be trusted to supply. So the faith becomes a part of the *materia medica* of the good physicians. Evangelist Shi is a notable example of an opium smoker made over into a winner of men. He was a great story teller, and, as is customary in China, related tales to crowds as a sort of monologue dramatist. For twenty years he smoked up his considerable earnings until rescued by Dr. Macklin. For another twenty years he has been an evangelist, with few equals in all China. Not all who come are cured, and not all who are helped become Christians, and not all who become members of the churches are heroes, but the many who are cured commend the religion that sent them such a physician, and the many who are thus led to consider Christianity, and to adopt it, give a testimony that is unanswerable, and from among them come an array of heroic souls that is not equaled outside the mission field. "The aim of foreign missions is not to care for all the industrial, social, economic, and physical ills of the non-Christian world, but to plant there the living seeds of the gospel of the incarnate God," says Robert E. Speer. "The gospel is to be the healing of the World."

Philanthropic work opens the resources of the lands to which it ministers. Buddhism and Confucianism have both been stimulated to imitate the benevolent

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efforts of Christianity. They have opened schools where before they had none, and Buddhism to-day is copying the Young Men's Christian Association with a Young Men's Buddhist Association. Confucianism's "Halls of Learning" are, in places, taking over the attributes of Association work. The Chinese are building hospitals and endowing them here and there. The only difficulty they meet is that of adequate sympathetic interest on the part of physicians, for the missionary is not equipped with science merely, his sympathy is the better part of the cure. The rich are learning how to give to benevolent enterprises. A Hindu woman recently gave \$60,000 for a hospital. Dr. Macklin has received several thousand dollars, one gift being that of \$3,000 for his charity work. Li Hung Chang provided for the current expense account of the hospital and dispensary of Dr. Mackenzie at Tientsin, and wealthy Chinese gave \$10,000 for its erection. Two years ago the officials at Changsha gave the Yale mission \$1,400 for medical work. The late Dowager Empress of China gave \$7,500 for the founding of a medical school. The Emperor of Japan gave \$5,000 for Young Men's Christian Association work during the Russo-Japanese war. The Crown Prince of Korea gave generously for the Association building in Seoul, as did also Marquis Ito and his friends. These are but few examples. Even in Africa the King of Toro has built a hospital. They might be multiplied innumera- bly. Some day Christianity will have so leavened the life of the lands to which it takes its message of sympathy and its hand of healing, that they

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will provide for their own poor and distressed; in doing so it will have lifted the whole earth nearer the Kingdom of God. "The movement led by Christianity has resulted in releasing thousands of the inmates of brothels, in an effective temperance crusade, and in the establishment of many benevolent institutions, such as the famous Ishii orphanage," says John Mott, in speaking of Japan. "The gospel of healing is one that makes its own way into the hearts of the people," said Wu Ting Fang, in commending medical missions. The medical missionary is given entrance into official circles, and all doors open most easily to him. He breaks down prejudice where it counts for most among peoples who are ruled from above and who accept the attitude of the ruler as a model for their own actions in things that relate to the new and the alien. He goes where it would be dangerous for any other man to go, because he takes healing, and all who suffer are grateful to him who gives relief. Thus his lancet opens the door and his message of life is listened unto and becomes a means of ingress to the evangelist and teacher.

The fame of the medical missionary spreads far and wide. He opens hearts by his ministrations, and they open homes by their commendations. Dr. Mackay pulled 21,000 teeth in Formosa, and so relieved a common pain that whole villages were opened to his message. Dr. Macklin was traveling some days from home and where hostility for the foreigner was marked. He could get no entertainment and night was upon them. Mr. Cory, who was with him, was asked, by a man who happened to come along, the usual questions

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as to where he was from, etc. When he replied "Nankin," the man eagerly asked for Dr. Macklin. When told that he was in the party, this man eagerly invited them into his home, made them comfortable, and hastened to tell the neighbors. Through him many listened that night. He had been cured by the good physician many years before. Mobs have been quieted by such men, and lives saved. They have opened doors long before the evangelist's feet came to enter them. Bars of prejudice and superstition are broken. Dr. Clough baptized 10,000 after his famine relief work, though he had waited long for an opening. Even the most bigoted of Oriental Jews have yielded to the persuasion of the medical missionary. Islamic centers have not been able to deny him entrance, and their fatalism has had to surrender to the magic of his medicine. Among the Mohammedans he must lead the way, for their intolerance is great and all but Moslems are infidels and dogs, but they suffer and are healed, and a friendship thus won opens hearts closed by intolerance and dogmatic hate. Arabia is to-day calling for doctors to open closed doors with their lancets, and there is no place in the world where there is permanent denial to the good physician. His cause runs before him. Dr. Porter received patients from 1,031 different towns and villages. One hospital in Bengal has had patients from 2,091 villages. They come to get personal benefit and go to carry a message of good will to all men. The hospital and the orphanage have arms that reach out to distant places, and voices that speak in many tongues. Their evangel is self-transporting, and they make the voice of the

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heathen to praise Him who giveth all good. Whole villages are won to the message; entire tribes have been known to turn an open ear and an understanding mind, through the tidings carried by some who had been benefitted by Christian benevolence.

There is no caste in the clinic. The silk-gowned aristocrat sits beside the ragged coolie, for pain makes all men of kin. The missionary refuses to recognize their artificial social lines in his ministrations of healing, whether it is of body or soul. The rich learn a fellow sympathy under his ministrations, and, in gratitude, aid him in the care of the poor. The native Christians become sympathetic and charitable under instruction in the arts of benevolence. The Great Physician commends unto them a spirit of fellow-help, and many become Good Samaritans to the need about them. That parable of neighborliness is often reacted in the mission field, for there the priest passes by the suffering and the despised convert turns aside to lend a hand. Ex-Secretary John Foster said that if not a single convert had been made in the past century, the social and moral benefits that the missionary had taken, in his practical benevolence on the field, would amply pay for all the blood and treasure it had cost. The friendly and sympathetic hand finds way into the closed homes of peoples who condemn their woman-kind to seclusion and ignorance and takes with it cheer and lessons for mind and hand, and above all, a touch of the larger life for the heart of the poor prisoners to a social custom. Here woman carries, as in no other sphere, the sweet sympathy of Christian womanhood.

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She takes the sunshine of a new hope inside with her, and not only cures bodies but enlightens eyes, and, in many cases, so breaks down prejudices that doors are opened and a little of the world let in. These ignorant, custom-blinded, and prejudiced women are the main defenders of their own imprisonment and the chief obstacle often in the way of a greater freedom for caste and class. They are superstitious and intolerant of innovation. There are millions of them in Islam and in India and China, who would rather die than allow a male physician touch them. If the husband consents to accept this help, it is only because he is the one in a hundred who loves his wife or daughter enough to throw prejudice to the winds for the sake of saving a life. If he does not so love them he refuses, for wives are cheap and custom is a cruel taskmaster. "We dread your lady doctors," said a Hindu, "they enter our homes, win the hearts of our women, and threaten the foundation of our religion."

Medicine and religion are bound up together in the superstition of heathenism. The witch doctors of savagery are adepts in the arts of incantation, and their theology teaches that suffering is the result of spirit possession. The quackery of all the unscientific practice of paganism is mixed with superstition and religious charlatanry. It is fitting that religion should remedy the superstitious practices of charlatanry and carry a scientific medicament with its intelligence and its liberty for the souls of men. Coming in the name of religion, the treatment is received with a faith that it might not otherwise receive, and the

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cure opens the way to combat superstition and false religious practices. Above all, it ministers in the name of Him who went about doing good, and so teaches the real art of Christian living as it carries the message of a Christian Savior.

CHAPTER IV

Education: The Means of Progress

1. THE MISSIONARY CONTRIBUTION TO CULTURE.

The conquest of ideas can not be tabulated, but it is none the less sure; it is the undercurrent that irresistibly carries all that floats its seas. The surface play of politics makes for little compared to the deep influence of ideas. Rome conquered Greece politically, but Grecian ideas conquered Rome. The art, the universal language, the philosophy, and the culture of Rome was Grecian. We read the history of the Middle Ages in terms of war and diplomacy, but until we read the history of thought we do not understand that interesting period. We misjudge Christianity when we recount the surface play of ecclesiastical politics during the so-called Dark Ages, and charge it up to the religion of the Nazarene; it was a time of struggle between the political forms and crude customs of the old pagan civilization, and the startling innovations proposed by the new ideas of the Man of Galilee. Those ideas have not yet come into their own, but it is the philosophy of life and the vision of universal brotherhood they bring that is transforming the heart of the world and changing the currents of history.

The missionary has ever been a pioneer in the conquest of ideas. Wherever he has gone he has taken

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the schoolhouse. He has rooted out idolatry and superstition and banished dark ignorance with the light of his flaming torch. He has given the Scriptures to some five hundred tongues, and is pressing on to give it to all others, and to give with it the universal art of reading. He has written text-books, compiled dictionaries, constructed grammars, translated works of science, law, religion, political economy, history, and sociology, and counted every item of knowledge he could put into the vernacular of a people a distinct contribution to their welfare, and a step in bringing in the Kingdom of God. Robert Morrison not only translated the entire Bible into Chinese, but compiled an encyclopedic dictionary of their difficult language; either task would have been a monumental work for one man. William Carey translated the Scriptures and other religious material into more than thirty languages and dialects in India, and founded a college besides. Gutzlaff wrote sixty-one volumes in Chinese, two in Japanese, one in Siamese, five in Dutch, seven in German, and nine in English. The Chinese have been debtors to the most phenomenal literary labors of modern times. Morrison, besides the monumental labors mentioned above, wrote twenty-five volumes in Chinese, Milne gave them twenty-four, Legge twenty, and Faber twenty-seven, while Dr. Muirhead, in later times, gave them thirty books, Dr. McCartee thirty-four, and Dr. Edkins wrote fourteen in Chinese, seven in English, and one in Mongolian. Other fields have received like contributions in literature, and there is no phase of human knowledge that has not been given to the pagan world at Christian hands and given

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as a glad contribution for their welfare. One mission press of China puts out 84,000,000 pages annually, and another in India more than 76,000,000 pages. The 160 mission presses in all the fields issue no less than 12,000,000 copies of various publications annually, according to Dr. Dennis, and send out more than 400,000,000 pages as Sibylline leaves to carry prophecy of the coming better day, when the knowledge of the Lord shall cover the earth as the waters the sea. Bibles and parts of the Bible are annually distributed by hundreds of thousands, and in all the older missionary fields are now gladly purchased by the people. This general diffusion of knowledge among the reading minority has stimulated greatly the love of learning among all the people, and substituted a live and modern view of the world for the ancient traditions. It has vastly aided China, Japan, and Korea to turn their faces from the sunset of the past to the sunrise of the future. It is helping to put a historical perspective back of Hindu speculation, and to train the Indian mind toward practical and serviceable knowledge. The missionary sets ideas to work, and, increasing modern knowledge, banishes ancient superstitions, and turns the pagan mind from its distorted conception of natural phenomena to a more scientific conception of nature, and thus sets him on the road to open-mindedness and progress.

When the first Irish missionaries set out on their journeys to the wild men of Scotland, Northumbria, Friesland, and Germany, they took with them the fundamentals of education. In Ireland, St. Patrick's Christian settlements had been communities for in-

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struction. Columba founded a school with his church at Iona. Boniface's monasteries in Germany were also schools. The Jesuits originated the idea of separate Christian communities in their "Reductions" in Paraguay, and carried the idea into the missions of California; in them they taught the converts the rudiments of learning and gave an industrial training. Duff became the founder of the modern school system in India. Verbeck established the first college in Japan, and is the real founder of the Imperial University. Dr. Murray was invited from America by the Japanese Government to establish its modern school system. Dr. Martin has been justly called the father of modern education in China. Stewart, of Lovedale, set the type of educational institution for savage Africa, the inspector of schools for South Africa saying, "A visit to Lovedale would convert the greatest skeptic regarding the value of native education." The missionary is the real founder of modern education in all the non-Christian lands. He sows the seed, sets the ideal, inspires the organization, and generally manages the beginnings of governmental efforts, besides actually educating the leaders in his own institutions.

The non-Christian world is an ignorant world. Two-thirds of humanity can not read and write, and the most of that illiterate population is non-Christian. In India there are 278,000,000 illiterates, or 891 to the thousand, while in the United States there are only 65 to the thousand. In Japan only the upper classes could read and write before Western civilization entered. All Africa is black and sodden in ignorance, and, except where the missionary has taught them,

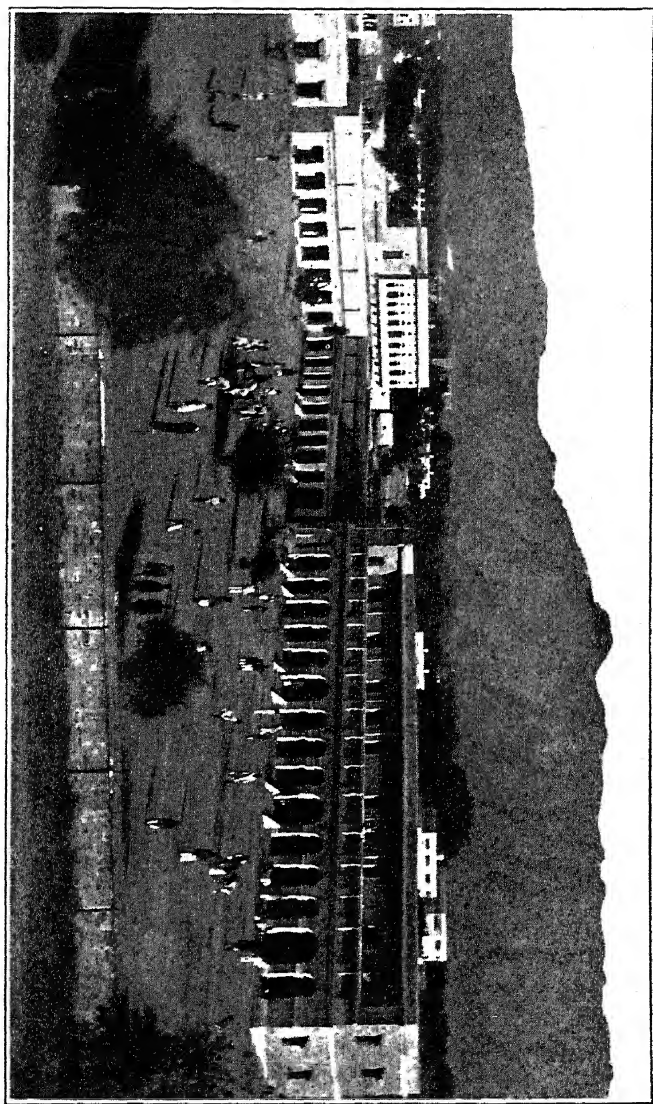
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do not so much as know that writing is possible. China has long honored her literati, but has had no public school system that reached the masses, and has left her womankind in almost ~~total~~ ignorance. Korea's education began within the missionary era of her present inner transformation. Confucianism and Brahmanism both possess educational ideas, but both make it the vehicle for turning the face to the past, and crystalize social custom and forbid progress. Confucianism is democratic in that it opens the way for any boy to become learned if his parents can purchase the instruction, but it provides no universal education and it instructs in the classics instead of the sciences, and trains the mind by verbal memory rather than in logical thinking. Its classical writings are morally pure, even more so than those of the ancients we teach to our Western youth, and they, at least, are set into the circle of the national life, but they give little practical knowledge, and they bound China to the mummies of a past. Brahmanism forbids instruction to any but the caste, and thus denies education her right to remake society; she makes learning consist in subtle speculation and knows no practical arts. Buddhism is the most liberal and progressive of the non-Christian faiths, but even she has never reared a public school system, made learning popular, or educated women, and her desire to escape from the toil of things material destroys all desire to know more of the practical world. In Burma, Siam, and Tibet, where Buddhism has been kept purest and has been regnant for centuries, she has never educated the populace. Islam led the world in the gift of culture for four centuries,

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but had no power to overcome her own limitations, and her world to-day is one of blind ignorance, fatalism, and superstition.

The East is awakening to the advantages of education. They have discovered there is no hope of progress except through the school as the vehicle. There are 500,000 youth in the high schools, colleges, and universities of Asia to-day. One-fifth of all of them are in the missionary institutions for higher learning; this measures somewhat the part the missionary is playing in the educational renaissance of the East. But no government, with the single exception of Japan, has yet arisen to the situation and furnished adequate instruction for all. In China the most remarkable transformation in the history of the world is taking place. Her temples are being turned into school-houses, and her ancient examination stalls have been torn down in favor of modern learning and more approved and efficient civil service equipment. Her officials have urged the people to give their offering for the dead to the schools; it would amount in Shanghai alone to \$350,000 annually. In Tientsin the government has forbidden such gifts and has established modern schools from primary to university. Her projected educational system will establish a university in every province, a high school in every considerable town, an elementary school in every village, and crown all with magnificent graduate and technical universities. But to-day she is able to furnish schooling to only one in from every forty to fifty-five of her youth, and has as yet only a few of the million teachers it will take to instruct all her young people.



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In India, with the English Government's universal school system, there is only one in every fifty-seven under instruction, and the missionaries are educating one-third of all who attend college. In all the non-Christian world not more than one-tenth of the population can find a school open for their children, and of that tenth the great mass are not inspired with a desire for education. Tradition surrenders slowly, except it be given a mighty dynamic within.

The missionaries are to-day instructing nearly 1,500,000 youth in their 25,000 institutions of learning. Some of the large institutions of higher learning are under missionary auspices. In India they have 72 high schools, colleges, and universities with more than 250 students each, and there are 17 colleges with a total attendance of more than 17,000 students, several of them with from 1,400 to 1,800 apiece. St. Peter's College at Tanjore, Madras, has educated more than 5,000 young men; Assiut College, in Egypt, has graduated 2,000, and St. John's, in Rangoon, Burmah, has taught more than 12,000. The United Presbyterian mission in Egypt conducts 150 schools, with an attendance of 16,000 students, one-fourth of whom are Moslems. In Persia there are 5,000 in the mission schools, and in some of them one-half the pupils are Moslems. The Syrian Protestant College at Beirut, Syria, has 850 students and a faculty of seventy-two men; it is making the leaders for all that territory and is finely equipped. Robert College at Constantinople is one of the most remarkable of existing educational institutions. Prof. William Ramsey says he found their graduates over all Turkey and

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the Balkans, and that everywhere they are men of integrity, patriotism, and breadth of culture. It was the graduates of Roberts that led in the emancipation of Bulgaria. Urumia College bids fair to become to Persia what Roberts has been to the Balkans and Turkey. In all Turkey there are 700 schools, with 41,000 students, largely under Congregational auspices, and they have furnished the new blood and the modern ideas, in no small part, for the remaking of the empire. In Japan the missionaries are now confining their educational work to that which the government does not adequately supply, *i. e.*, kindergartens and high schools. The Doshisha was the pioneer of Christian schools there and graduated many of the leaders of modern Japan. Its alumni have recently raised \$100,000 for its further endowment. St. John's College in Shanghai is one of the solidest educational institutions in all the East. Madras University is a great school, with over 1,700 students. In Africa the Blantyre Mission has fifty-seven schools, with 4,000 pupils, and the Livingstone Mission has 207 schools, with 16,000 students. In Uganda there are 60,000 under instruction, and it is a disgrace not to be able to read. These are but a few of the large number that might be named.

Some of the great student centers of the world are now to be found in the Eastern capitals. Tokio claims first place, with 50,000, while Calcutta has 20,000, Peking has 17,000, and Cairo has more than 10,000. The tendency is for the masses of students to gather in these centers in each country. The great question of the day is regarding the moral quality that

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these students will take away from the colleges with them. Herbert Spencer said, "The idea that mere education is a panacea for political evils is a delusion." He was introduced at a dinner given him by the notable literary men and educators of New York by William M. Evarts, who, as toastmaster, said, out of compliment to the great compiler and apostle of knowledge, that the attainment and diffusion of knowledge was the promise and the hope of America. He replied that he was embarrassed to have to take issue with one who had given him so kindly an introduction, but that it was not knowledge but character that was the hope and promise of America. Premier Katsura, of Japan, wrote President Harada, of the Doshisha University, congratulating him upon the manner in which the college had stamped character upon the young men of Japan, and said, "May it become a citadel of culture." In India even the government officials acknowledge the inefficiency of the national schools in the training of character. Count Okuma has been especially emphatic in his apostleship of the idea that character must be given with education or it is a failure, and has ever commended both the Christian schools and Christian ethics as the true source of it. The school of a non-Christian land does not have the Christian for a teacher as it usually does in America and Britain, and education all too often means no social conscience, but only a means for individual preferment. As a consequence, the educated man is not less licentious or corrupt in office, but more artful, and, without social conscience, he fails to uplift his kind. "What you would put into the life of a nation, put

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into its schools," says an old German proverb. All the East is awakening to the need of a high moral tone in education. One-half of the 100,000 young men in the higher schools of learning conducted by the missionaries will give themselves to teaching.

2. CREATING A LEADERSHIP.

The Christian community becomes a leaven in the midst of the pagan community; its ideals gradually take hold, and many who do not confess the faith come to practice the precept. Keshub Chunder Sen, the founder of the Brahmo Somaj of India, was led by the teachings of Christianity. Mozoomdar was converted by Christianity, and, while unable to unite with a divided church, gave his great influence to Christian morals. Many of the leaders of Japan and China have accepted the morals of Christianity and plead with their youth to do the same. The late progressive king of Siam was educated by a missionary. But it is not the leaders alone who are lifted up by contact with Christian thought; it enters into the customs of the common people and raises the standards of living and the grade of common intelligence. There is no influence so pervasive as that of personal contact, and every true native Christian touches many of his neighbors. Thus there comes a leadership of ideals and ideas that is pervasive and elevates all living.

Nothing more fatal could happen than for a people to accept the externals of Christianity without getting its vital life. They would have thrown away what discipline their old faith gave them, and taken none of the moral sanctions of the new in its stead. Here

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lies the danger of Western innovation and material advantage impinging upon the culture of the East and the barbarous life of savagery. Education assimilates the outward to the inner and fits a man to enjoy the greater material advantages of civilization and freedom from the old bondage, without losing himself in a riot of riches that he does not know how to use. "A change of mind is needed as well as a change of heart." Mere conversion is not enough; the convert must be instructed in the things of the new life. The danger of education in Asia is that it will fail to give character to the leaders of the next generation. The destruction of the old superstition is followed by a reaction against religion. Such was the case in Japan, where a smattering of scientific knowledge all too often meant the danger of a little learning. Most of the 40,000 students in the higher government schools of learning in India are skeptics in regard to all religion. No educated man is an idolater, and all too often he is a materialist, pure and simple. It is fortunate for India that every third college man is under Christian instruction.

Missions have played one of their greatest rôles in the furnishing of leadership for the awakened nations of the East. William Elliot Griffis says that previous to 1890 most of the leaders of new Japan had been educated in the mission schools; that fact may account for the lack of excesses in the revolution. One-half the mission students of China take up teaching or direct Christian service, and their influence in tempering the new era will be recognized by the leaders of new China. In Japan no less than twenty of the editors

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of the leading dailies are Christian men, while the number of Christians in Parliament and the leading offices of state is out of all proportion to the number of church members in the empire. Duff said, "The real reformers of Hindustan will be the well qualified Hindus." The Director of Public Instruction for India said, twenty years ago, that at the present rate the Christian community of India would ultimately furnish most of the professional leadership of the nation, and that they bid fair to become the industrial leaders as well. An instance of their progress in leadership in China is given by the Commercial Press of Shanghai. It was organized by Christian young men, graduates of mission schools, and took for its avowed purpose the creation of a Christian enterprise on Christian principles, and was inspired by the opportunity to serve the nation through furnishing good literature. To-day it does a business of a million a year, furnishes 70% of all the books printed in China, keeps the Lord's Day, and is one of the most reputable and honorable business enterprises to be found anywhere. The literature of modern Japan is predominantly from the hands of men educated in the mission schools.

If the church is to be strong on the mission field, it must have an educated leadership, and that leadership must be increasingly native. No foreigner can appeal to a people as can their own leaders. Those missions that have paid all but exclusive attention to evangelism and have neglected education are to-day suffering for leadership, while those that both evangelized and educated are growing with increasing momentum. The London Missionary Society is notable

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among the latter; it is to-day multiplying its native staff much more rapidly than that of its foreign leaders, and reaping consequent benefits in self-supporting churches, Christianized communities, and an efficient public leadership for all social advancement. In Japan 15% of the graduates of mission colleges have gone into teaching or direct Christian service, 5% have taken government positions, 30% have gone into business and the professions, while 35% are pursuing advanced studies. In China the mission student is handicapped at present by governmental regulation. China is yet afraid lest foreign instruction means the domination of the alien, and compels all government students to bow to the tablet of Confucius and forbids any to vote who are not from government schools. These fears will soon subside, and, as in Japan, the Christian young men of education will exert a wide influence in the making of the new China. There is also a great handicap to the Chinese church in its claims on its graduates for direct Christian service. They are accused tauntingly of "eating the foreigner's rice," are compelled to work for from one-third to one-twentieth what commercial and government service pays, and, in some instances, ignorantly classed with the priestly element and despised accordingly. That one-half enter either direct Christian service or teaching, and thus become the real leaven of the new order, is a magnificent tribute to their spirit of self-sacrifice and their love of fellow-man. The new patriotism in China exalts service of the nation to an almost religious enthusiasm, but the missionary is even less concerned about making officials than he is

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about furnishing the educators and social welfare exponents of the new era; for the men who create the ideals and inculcate the ideas for the new era will most effectually mould it. The church in every mission field needs men who will interpret Christian principles into the indigenous thought of the people. To that end the missionary candidates of to-day should be well instructed in pedagogy, and know how to impress the mind of the native student with principles without destroying his personality as a native. The mission school is vastly superior to any other on the field, in both morals and pedagogical efficiency, but the latter needs further strengthening. Most of the higher schools of learning are sadly undermanned. What they are able to do with their inadequate staffs is one of the marvels of missions, but if the church would rise to her opportunities, she will supply adequate faculties and hasten the day when Christianity will have both a competent leadership for herself in the field, and also multiply her power to furnish thoroughly Christianized leaders for all spheres of life.

Educated youth make the morrow. In our own country the 1% that takes a full college course occupy 70% of the positions of influence. How much more will it be so in nations in the making? The education of the many lifts immeasurably the whole standard of living. The missionary generally has to begin with the lower classes in his schools as in his churches, but education makes these dispossessed of one generation the leaders of the next. Efficiency will eventually take command, even though the odds be great. The educational ideal of life leavens the whole social life

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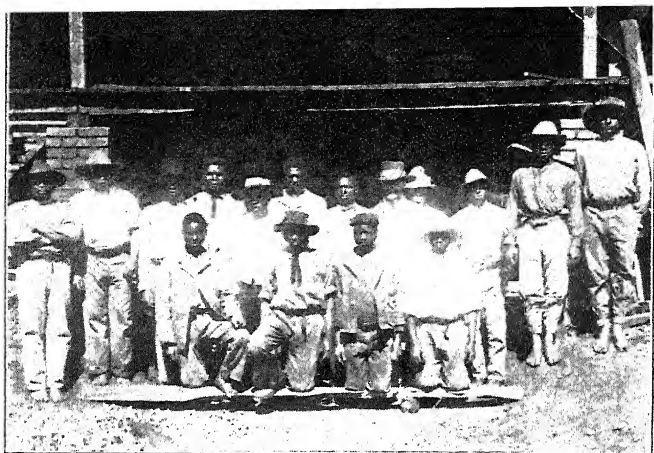
of a people. It establishes a democracy and destroys caste. In India to-day there are 170,000,000 bound by the thongs of caste. In all paganism womankind is socially of lower caste. Most religions stand for a sort of caste preferment for their adherents. Mohammedanism constitutes itself a proud caste wherever it exists. Brahmanism confines its glories to the few who are born within its sacred precincts. Those educated in the writings of Confucius are a select class in China. A Brahman of note said before an audience in Allahabad, "I am a Brahman of the Brahmins, and of the most orthodox school, but I must confess that the way in which Christianity has raised the Pariahs of Madras is beyond all praise and puts me to shame as a Hindu." The Christian patriot of Madras says, "The Christians look back to the era when a few Galilean peasants turned the world upside down and shook the ancient fabric of civilization, and then look forward to when the emancipated Pariah shall stand amongst those redeemed by Christ from every kindred, and tongue, and people, and nation." Idleness is no longer dignified, work becomes respectable, and it is no longer said as in a Hindu proverb, "He who reads must be waited upon by him who does not." Self-reliance and confidence take hold of the lowly and men are made potential with a new power. A new environment is gradually created, and in it the multitudes who follow are given a larger opportunity. "It must be remembered," said Gladstone, "that the moral standards of individuals are fixed, not alone by their personal convictions, but by the principles, the traditions, and the habits of the society

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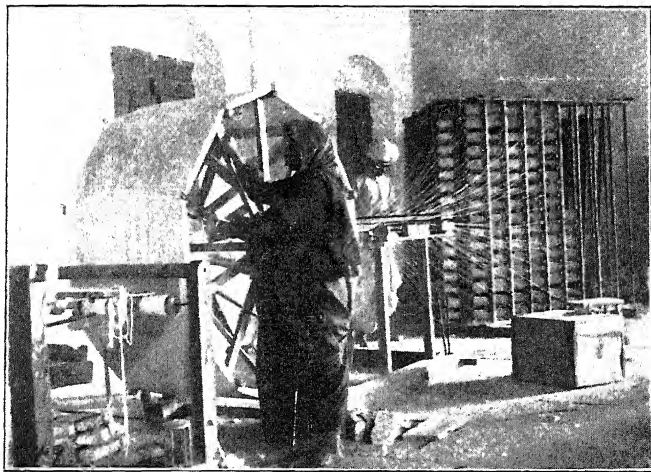
in which they live and below which it is a point of honor, as well as of duty, not to sink. A religious system is only, then, truly tested when it is set to reform and to train, on a territory of its own, great masses of mankind." With this challenge, Christianity goes to educate the leadership of the nations, confident that what has come to pass in the West will also come to pass in the East, and unto the uttermost parts of the earth in the course of time, and that all men will be elevated into high planes of a civilized life as the leaven of knowledge and of righteousness runs through the whole measure.

3. TURNING LIABILITIES INTO ASSETS.

"As a pagan, the Indian was a liability; as a Christian he is becoming an increasing asset," says a Canadian Government Blue Book. Practically all missionary work among the Indians has been conducted with industrial training. The success of Metlakahtla, and such superbly successful efforts to create a higher type of Indian community, has been based upon the training of hand with head and heart. William Duncan has made Metlakahtla a type of peace and prosperity, such as few pioneer white communities can show. He found the Tsimshian Indians of British Columbia a savage, degraded tribe. They gave him scant courtesy and put him in grave danger often. After a patient effort he won their confidence, induced them to give up drunkenness, and organized them into an industrial community. It became a model of peaceful, industrious, Christian neighborliness, and is to-day one of the shining examples of missionary



A Class in Carpentry—Rhodesia, Africa. Illustrating the practical manner in which the mission school founds education in the practical arts.



Cotton Weaving in India, illustrating how the missionary helps the people to help themselves.

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power to create a civilization. The primitive man has little sense of precision or accuracy, and less of logical thinking. The watch and the mirror excite his wonder, if indeed they do not arouse his apprehension lest they be possessed of demons; but it never occurs to him to make inquiries as to their construction until the white man gives him the lesson that unburdens his conception of magic and instills the first ideas of science. In the native mind, idea and action are not always coupled together. The reality of a thing and the thought concerning it are not connected. The Hindu may possess the finest of speculative intellects, but he can not invent a harvesting machine; so, too, he may know all the doctrine and not think of his obligation to live it. Character consists not in knowledge, but in doing what one knows to do. Stewart, of Lovedale, said that the native "confounds instruction and education." He may learn all the lessons, but not practice any of them. What he learns must be assimilated into character and personality. He must be not a hearer only, but a sincere doer of the word.

The catch-word of present-day pedagogy is, "no impression without expression." It is dangerous to know much and to feel much without doing much. It is of such stuff that hypocrites are made. The missionary finds a people in Africa and other barbarous lands that are idle and without ambition. In the Malay States it is impossible to hire the natives to work. A shake of the tree and he has fruit, a line into the sea and he has fish, a bit of beaten bark and his wife has him a garment; he builds his house of a few bamboo, and may while the sultry days away with

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games and the chewing of beetle-nut, so why should he work; money would only buy things he does not need, and he has no ambition to raise his standard of life. In contrast to this is the report from the interior of Africa, where Dr. Laws of the Livingstonia Mission tells of thousands of formerly idle, half-starved Tongas now in the employ of the African Lakes Co., and even of hundreds of the wild and war-like Angoni, formerly contemptuous of aught but the raid and bloodshed, having become industrious and peaceable in their habits, all through industrial training in that mission. The Catholic Bishop, Casartelli, says that their experience in North Africa is, "that without some preliminary training in habits of work and industry, which are at least the rudiments of civilization, religious or moral teaching has little if any moral effect." It trains the constructive or creative powers and develops faculties that book instruction does not develop; it stimulates the motor activities and cultivates the inventive faculties; it gives resourcefulness and a sense of possession that arouses the instincts for accumulation, without which man will not provide for the morrow. "The native thinks little of the future," says the Principal of Blytheswood. It is a feast or a famine with him. He gets a regard for work, whereas he has despised it. The luxury of idleness is an ideal of savagery. Industrial instruction trains his mind in observation, precision, accuracy, and creation; it panoplies him with those fundamentals of civilization—thrift, industry, and a desire to do things. There is an economic basis of civilization. The pagan peoples are poverty-stricken because they

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have so little creative power and because they have little idea of conservation.

Civilization arouses new wants. The artisan is necessary to progress. The native must begin where he is, and build step at a time. He can not lift himself with book education if it makes him abhor his kind, or does not fit him to do the next best thing for his people. The Livingstonia Mission in Central Africa gives its industrial instruction in houses built of the same material its students will have to use in their future work in the village. It aims to use the native tools and such improvements on them as can be made, together with instruments that the native-trained artisan can make for himself, in order that he may not be a workman without tools. European tools are better, but they are expensive and remote, and the aim is to make all skill acquired practicable to the immediate situation in Central Africa. Some missions have erred in training lads to become skilled in things that were not in demand in their country, and thus left them skilled but without a job. Hampton and Tuskegee furnish the models for modern industrial mission schools. Their ideal is to fit the student to meet the actual conditions as they exist about him, and to better them in all practical ways; to make every graduate capable of earning a livelihood for himself and family, among his own people and by ministering to their welfare, and to give every one a desire to do actual labor. The first pupils in the African missions were taunted by the proud idlers, who lived by the work of their wives, with "selling their skins for money;" but the brigand was turned into an honest

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worker and industry replaced the slave raid. The native hut was built higher and wider and the new economic factor put on clothing in place of his old war paint and tattooing. The crooked path that had been made by generations of savage feet was broadened into a roadway, and oxen were hitched to the loads that women and bare-backed men had been accustomed to carry.

A literary training may "make drones where workers are needed." It is a missionary experience that the native may be educated out of his environment by being taught as the American school teaches. There must ever be teachers, preachers, and clerical workers trained, but even they will be all the better trained by having wholesome education in the arts and crafts. The old Jewish custom would be good for the latest civilization. Every person would do well to have a trade, and if there be any truth in John Ruskin's idea that there was no guarantee of wholesome character except one had toiled with his hands, it is dangerous to not have been through the discipline of industrial labor. The native who is sent abroad is liable to return with a contempt for his lowly brethren, and to be so educated above their manner of life that he can not articulate with it sufficiently to help them.

The late Charles Cuthbert Hall was convinced that industrial training was as beneficial as either evangelistic or medical missions in India. The Hindu has some arts that are rare, but in the best of them he uses the most primitive methods and wastes untold strength. The practical arts are not well developed,

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and the resources of the land and the people are not more than touched. The government is doing much to develop material resources, but until the people are made resourceful the greatest mine of livelihood is untouched. The native convert is liable to be ostracized and cast out, both from the common fund of his family and from the trade in which his guild works. The industrial school makes him self-supporting and self-reliant, and builds up a self-sustaining Christian community. The orphan children would be mere beggars and parasites on society if they were trained in mind and not in hand as well. The government schools have educated so many for clerical positions that desks are overcrowded; the great need of the land is for practical workers who can build up the solid foundations of life in character and economic resourcefulness, and break down the paralyzing system of caste that lays its hand on industry, as well as on all social life. In China the people are industrious, perhaps the most hard-working people in the world, but they use the tools of the times of Abraham. Their farms are tilled with a stick, sharpened with a flat piece of iron, a club hoe, and a hook that serves for reaper and general utility instrument. In the African industrial missions the steel plowshare was introduced and literally thousands of them have been adopted. "Why, they do the work of ten women," said the wondering natives. Chinese industries need modernization, and the adaptation of modern arts to native thrift puts the native Christian to the fore as a leader in his community. Dr. Osgood tells how he led a native carpenter into the better way through

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the use of a brace and bit. The appalling poverty and the barren hardness of daily living among China's millions is due, not to lack of native resources, but to lack of native resourcefulness. China can not build an enduring civilization of the new order without a solid foundation in the industrial arts and a rise in the standard of life among her masses. When the missionary trains the hands he trains in character and makes the individual able to lift his share in the betterment of society. Industrial missions do not play the part in China that they do in Africa, or even in India, but they have a large part to play in the educational work of the missionary. In Japan the thorough modernization of all life leaves the industrial mission pretty much the same function that it plays in education at home. The missionary has found it very necessary and useful in the orphanage, and wherever he offers any schooling in the common grades it becomes an integral part of good instruction. In Africa the industrial mission is the true foundation of all education and progress. When Dr. James Stewart proposed that the most fitting memorial to David Livingstone was a mission that would instruct the natives in the foundations of industrial order and usefulness and make Christians of them, he solved Africa's educational problem. The solution now only needs pushing on to the limits of its possibilities, and to the shores of the continent. Blantyre, Lovedale, Blytheswood, Livingstonia, and many others, are giving the example. It is safe to say that there is practically no mission in all Africa that does not use the industrial method, and in them tens of thousands are receiving,

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or will receive, the foundations for a new and better era. Civilization arouses new wants, and the missionary fails if he does not put into the hands of the new disciple the means of supplying them. In Central Africa there is a settlement of native Christians that has carved out a community life by the arts of their hands and through the desires of their Christianized hearts. A few of them first went off into the woods alone, and others were welcomed as they came. It is a place of peace and order, and even the Moslems have been coming to share in the new and better way. In India Christian communities of Pariahs have been established, and the poor outcast has become a self-respecting freeman, worthy, industrious, and self-supporting, under his own initiative.

4. TEACHING THE MOTHERS OF THE RACE.

"Since the world began it was never known that a woman could read," said the people of South India, when the first school for girls was opened. The non-Christian world has no system of instruction for its womankind. One of the most startling innovations of the missionary was the school for girls. The Hindu said, "You had as well try to teach the monkeys to read;" the Moslem said the same, only used the mule for his comparison. The savage marveled that the missionary talked and ate with his wife and made the ox do her work. England opened schools for India in 1854, but in that sad land only one out of two-hundred women above twenty-five years of age can read or write. In China not more than one woman out of three-thousand can read or write. In Japan

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the modern educational system is educating the girls, but takes few above what we know as the "common school" grades. The government provides no universities for women, and the three normal schools it does support cut off one year from the work given men. There is a great university for women in Tokio, with 1,000 students, but it was founded and is managed by a Christian scholar. In India the Hindu girls go to school, if at all, only until they are about eleven or twelve years old; they are then taken out to be married. There is only one girl out of every five hundred students in the high schools, and of the 112 women in the arts colleges, forty-three are Christians and thirty-three Parsis. In the primary grades the girls furnish only one pupil in seventeen, and only four out of every thousand of school age attend school at all; in the Central Provinces even that number must be divided by two. In comparison with America, only one Hindu girl goes to school to every seven hundred of our daughters.

In all pagan lands the women are the citadels of religious superstition; their ignorance and prejudice and natural religious interests make them such. The conservative men of pagan lands fear the education of their women as no other modern innovation. It means the overthrow of their ancient prerogatives of absolute lordship and a readjustment of the family life that spells revolution to the social order. Woman is an inferior creature, and all creation will be overthrown if she be not kept such. Hinduism and Buddhism teach that she has no salvation except she be born again as man; education teaches her that there

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is a worth in her own soul. The Chinese women replied to early missionaries that it was no use to teach them, they had no souls. Even Burman women, the freest of all, have little education, though they possess an initiative that makes them superior to their husbands in much, and, when educated in Christian schools, acquire a grace and poise that makes them the equal of their Western sisters. There is no elevation of race possible, unless its mothers are elevated; one had as well expect water to rise above its own sources. Woman becomes the citadel of religious morality once she is Christian; the natural refinements of her nature and the mother instinct for the preservation of her young make her so. "There is not a woman in Christendom that is not under infinite obligations to the Christ," says A. McLean. If women were sensitive to the benefits that Christianity confers upon their sex, they would not only outnumber the men in the churches, they would so train their sons in the love of Christianity, for their mother's sake, that multitudes more of them would pay a juster tribute of respect to the emancipator of their mothers.

When Mrs. Marshman founded the first school for women in India more than a century ago, she drove the thin end of the wedge into the bed rock of heathenism. India has produced some of the most remarkable women of the last and present generations; but every one of them has been educated in mission schools, or has come under the influence of missionaries. "For a woman to be without ability is her virtue," was a Chinese proverb, but a Chinese woman's journal to-day declares, "The woman who remains in ignorance

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wrongs not only herself, but her family and her country." "What women these Christians have," cried the teacher of Chrysostom of old, and Mozoomdar wrote the same back to India when he attended the Congress of Religions in Chicago. In Cairo there was recently held a great mass meeting of women at which a princess made the leading address. They demanded that the harem be overthrown, the veil discarded, and that they have the right to give their own hands in wedlock. The schools for girls have not wrought in vain in Egypt; even men who were bitterly opposed to them now desire their graduates as wives for their sons. The Moslem girls of Syria were formerly married at the age of twelve, but the Christian school has so wrought among them that few are now married before fifteen, while the Christian girls wait until they are eighteen or twenty; thus is given another concrete instance of the social leaven at work in the mass, through the influence of a minority who are under thralldom to the principles of the gospel. In Siam the Minister of Education said that it was through the influence of missionary schools, and the work of Christian women in teaching girls, that schools for them were founded in Siam and supported by the government. In Korea the rapidly growing Christian community can not get enough teachers to instruct all their children; for the new found faith opens their natural hearts, and they desire all their children educated without reference to sex. In China one-half of the Christian women learn to read, though they are not converted until mature. "Your Bible must have been written by a woman," said one of them,

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"it says so many kind things about women." The missionary does not confine his instruction to the school room; the church itself becomes a school and the lesson is carried into the home itself by the hands of those faithful women who do the effective evangelism of home visitation. Mrs. Montgomery says the "woman's club" seems to follow Christianity all over the earth and tells of one in Portuguese West Africa, to which scores of the native women come, some walking as much as one hundred miles to attend. They talk over all those home problems that women in our own land talk over when they come together in their mothers' meetings, and no more effective civilizing work could be done than that of guiding their minds in the discovery of humane ways of caring for their children, and in teaching them that cleanliness which is next to Godliness.

The education that is given on the mission field must be of the practical sort which fits the pupil to live in the midst of her native surroundings, and to grapple with local problems. The missionary does not build a great church edifice after the type of modern Western architecture, and stand up in it to preach to a people who have never learned what a church edifice is; he begins at their hearts and leads them along the upward way until he can lead them into the church which they may build with their own hands. So the education of heathen women must begin with their own problems and possibilities; to educate them out of their environment would be to waste time and lose opportunity as well as to make miserable the victims of mistaken method. It is no use to cry out against

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the position in which she is placed and butt the head of idealism against the stone wall of immemorial custom. It is better to overthrow it by the disintegrating force of new ideals in the native mind. The prejudice against woman becoming a public personage was respected by Paul when he counseled the women of Corinth to wear their veils. The women of Turkey took the same counsel to themselves, in the larger interests of reform, and resumed the veils they threw off when freedom first came. They will all the more surely be able to put them off in the end. The native ideals of woman's place in the home furnish the best channels for operation, and to make her a better home-keeper and a companion of her husband, to compel his respect for her and give her ability to rear her children with competence, is to put dynamite under the granite walls of pagan custom. An educated womanhood means the end of concubinage and polygamy and the gradual attainment of her right to refuse her hand in wedlock. Paganism makes her either a drudge or a toy. The first schools for the daughters of nobility and for the higher castes found parents unwilling that the girls should be taught domestic arts; they were to be the toys of rich men. The school brought a new idea of her place as a responsible factor in home life, and raised her from the position of a beautifully feathered bird in the cage to that of a mature and responsible wife and mother. These women are now founding schools for their own sex, such as Miss Tsuda's in Tokio, and Ramabai's in Poona, and are editing journals advocating the freedom of their kind. In Peking, a Mrs. Chang

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edits a woman's daily, devoted to all the reforms that the most progressive Chinese women desire. There must be highly educated leaders who can lead the minds of their sisters and do the work of teachers and physicians, but the masses of women must make homes, and the missionary seeks to make of them such home-keepers that the homes will be the transforming places of a new generation. There are not enough of the former as yet, and it is good missionary policy to train a host of native women to lead their kind into the higher life, for the most benign foreign Christian can not so search the heart of a people as can one of their own race.

5. EDUCATION AS AN EVANGELIZING AGENCY.

"When the infant goes to school, his father will soon follow him to church," said a French missionary. The kindergarten and primary school have been the fruitful source of many conversions to Christianity. They have trained up a generation of children with respect for the faith and with minds well filled with the ideals of Christ, and they have opened the understanding and won the hearts of many parents. Among the Karens 60% of the present-day members of the church were won through the schools. Eugene Stock, head of the great Church Missionary Society, and one of the greatest authorities on missions, says that in India the schools conducted by the missionaries have brought a greater number into the church than all other agencies combined. In Japan high school instruction has proved the most fertile evangelistic field. The age of adolescence is the fruitful period

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for reaping religious convictions. Missions would do well to make all possible of this stage of instruction. The churches at home are learning from modern psychology that adolescence, or the high-school age of youth, is the time of life when ideals reign most supremely in the mind, and when young men and women put their instruction into action most readily. They are casting off from the moorings of paternal authority and turning out into the seas of self-reliance and independent action; it is the revolutionary period of life, the turning time. A thousand high and middle schools in China to-day would reap a mature fruitage of educated and self-reliant men for the service of the cause to-morrow. The Doshisha students are under such educational management as are the students of Yale and Columbia, *i. e.*, the school is Christian but not denominational, and is conducted for the purposes of a broad education and not for that of conversion, yet the influence is such that one-third of all are baptized before they finish their course. This is really a remarkable record when we consider that the students come so largely from Buddhist homes, and from parents who, howsoever much they may be adapting their lives to the Christian way of thinking, do not consider that it is at all necessary or possible for them to unite with the infant church. In some of the mission schools of Japan as high as 65% of the pupils and 95% of the graduates become Christians. In all fields there have been more conversions among the educated classes during the past decade than ever before. Through the schools, the Christian theory of things, and the whole body of Christian history

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and philosophy is getting into the minds of the people, and all are drawn nearer the Christian conception of life. Christianity is no longer a strange and despised religion because of its being a faith not comprehended. In Livingstonia one-half the church members are the direct product of the schools. The evangelist may sow the best of seed in unprepared soil, and it may be unable to root deeply into life for the very lack of a prepared heart. Evangelism, as conducted on the mission field, is a matter of instruction; the preacher teaches, and before he baptizes his inquirer he examines him closely. But many can not hear because their ears are deafened with the discordant voices of old superstitions, and their hearts are hardened with vice.

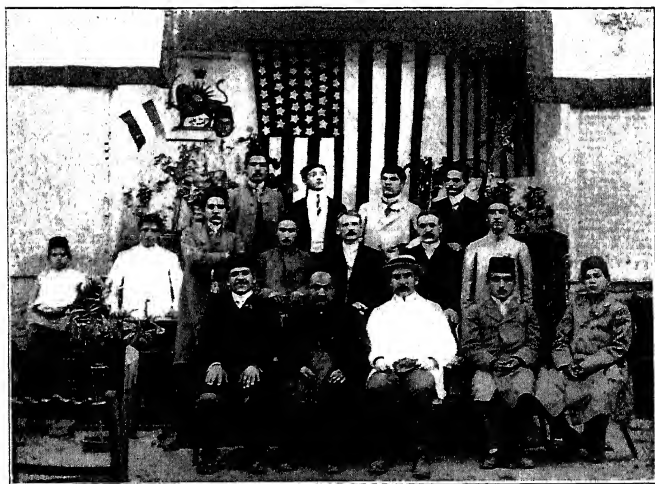
Education is almost the only way of reaching the high castes and the Moslems. Duff founded his college because of this fact. He found the proud Brahman inaccessible to preaching but a possible student under the tender of mature instruction, for he is an educated man and honors learning. The same thing is true of the literati of China. The Samurai of Japan have been the most fruitful class for the effective evangel of education. Their devotion to learning led them to the mission school, and as they turned their backs upon the past they opened their minds to the mature lesson of Christianity. The Moslem man is supposed to read the Koran; it is a religious duty. He may be uneducated but be able to pick out the Arabic of his sacred book. In Nigeria it was found that natives who knew not a word of Arabic were so drilled that they could pronounce the words

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of the Koran, though they knew not what one of them meant. But education destroys the Koran. Literary criticism pulls down its every citadel of authority as it does that of the sacred books of India, stripping them of the husks of myth, legend, and puerility, to say nothing of the unspeakable impurities there is in them—so impure that the English government in India forbade the printing of English translations of some of them. The contradictions, fatalism, superstitions, and gross materialism of the Koran are revealed to the educated Moslem, and, while he may keep a form of fealty to it, he will not be longer a fanatical and intolerant worshiper of its very covers. His mind is broadened, his old intolerance broken down, his prejudices replaced by ideas, he imbibes the spirit of Christian charity and becomes a new type of folk in the midst of Moslem society. To wear down the fanaticism of Islam, to give the Mohammedan world a fairer view of the Christian world after thirteen centuries of conflict, to put the spirit of the old Crusaders behind the gospel of the love of Christ, is the best that can be hoped for in the present, perhaps, but it is none the less a true evangelism, for it is preparing for a time when conversions will come by the thousands. There are to-day some 5,000 Moslem students in mission schools. Not many of them will actually join the church, the prejudice is yet so great, and the fanaticism that lingers is sufficient to forbid instruction in Christian history and doctrine, though it is given in some schools, but all of them will be nearer the goal and they will make a new generation of open minds.



The First Class of Christian Inquirers in Tibet. Dr. Shelton and Mr. Ogden baptized the first Christians in that land from this number.



Advanced Class in Urumia College, Persia. Moslems, Jews, and Christians are here drawn together, and ancient hates are lost under missionary instruction.

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Education is an evangelism of preparation where it does not directly bring the pupil into the church. It cultivates soil for the sowing even where the seed of direct Christian fealty does not take root. A noted English evangelist conducted a successful campaign among the missions of Ceylon, but found that nearly every one of his converts had been in the mission schools. The new can not always effectively enter until much of the old has been purged out. The second generation does not have to surmount the old walls of heathenism. Real Pentecosts are realized after the school has broken down the old barriers and changed the whole mental make-up. We have a Christian literature, breathe a Christian atmosphere, inherit Christian customs, live in the presence of churches, grow up in Christian or semi-Christian homes, and the golden thread of Christian philosophy runs through all we learn and think. It is not so in the non-Christian world. The mind of the cultured pagan is filled with the ideals and practices of his faith, and the social custom that has been fixed upon him by immemorial habit is never questioned. The savage heathen mind is undeveloped; he is the creature of dread superstition; nature is full of demons, and religion is a thing of fear. He has no scientific processes of thinking and is a sublime egoist. His social life is narrowed to the necessities of his selfish career and no man trusts another for good. The children of the mission schools are given a new mind, a new conception of the universe and of the past, and the seeds of a better life philosophy are planted in their thinking. The result is an accessibility to Christian truth on the part of many who do

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not possess the spiritual enterprise necessary to acquire the faith that comes with a proclamation of the Word. A minority do possess that spiritual enterprise and have hearts so open that the evangel grips them and changes their lives, their instruction following their conversion; but the majority need the soil of their souls tilled and prepared for comprehension of the truth. The school has thus been one of the most fertile of evangelistic agencies. Bishop Tucker, of Uganda, tells of their evangelistic garnering during the five years from 1902 to 1907; they baptized 36,000, or more than 7,000 annually, and so many enrolled as inquirers that it was with difficulty they could give them instruction. In South India to-day, after mature schooling and a generation of successful work, there are so many pressing for entrance into the church that the missionaries are actually not able to give the necessary preliminary examinations as fast as they are requested; single fields have had as high as 3,000 accessions in a year. John Mott conducted an evangelistic campaign among the students of Tokio that brought several hundred into the church, and has recently addressed student meetings in Egypt and among Mohammedans that taxed the capacity of the largest theaters and turned many away. It is safe to say that the faith of the Bishop of Madras, that 50,000,000 low caste men of India are ripe for the gospel, would be wrought into results if there were enough mission schools to reach them all. The rising tide of universal intelligence in India is unloosing them from the bonds that enthralled their minds and led them to accept their portion as one of the dis-

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pensations of fate. If they could be led to see that, under Christianity, there is no caste, but an open way to make themselves the real saving salt of India, they would bring a democracy to the nation that would overturn all her traditions and give her a basis for real independence. Every chapel in Korea is also a schoolhouse, and the evangelistic wave that is sweeping that nation is not of the perfervid variety, but based upon a real discipleship, a mind that is instructed in the elements of Christian truth. Dr. Laws, of Livingstonia, says their vital evangelism is in their schools where 16,000 pupils are daily taught Christian living. To leaven the social life of a people is to conduct a very real evangelism, and the reaction upon the life of the church is sure and permanent. "A sound Christian is always a well instructed Christian," says Dr. Hetherwick, of the Blantyre Mission.

CHAPTER V

The Missionary and the Affairs of the World

1. THE MISSIONARY AND OTHER POWERS OF PROGRESS.

"History shows no example of mere civilization elevating a sunken people," says Dr. Warneck. The heroic James Chalmers said he traveled all the South Seas, saw every kind of people, shared bed and board alike of savage and civilized, and that he never saw one place where mere commerce or political interference had by themselves taken positive and permanent good to the child-peoples. The story of the mingling of East and West is a tale of vice and crime, where it has not been relieved by the influences of those men who have not gone for the purposes of selfish gain. Gladstone said, "European intercourse with the uncivilized has, without exception, been disastrous unless attended by missionary exertions." The port cities of the Orient are famous for their wickedness; when two races meet they offer each other the worst they possess. The missionary is the one man who goes without selfish intent, and whose determination is to take social redemption and every other reform that will redound to the good of the people of the land. The trader goes for gain, and the soldier with a mission

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that compels him to look upon the native as an inferior, fit only for subjection. The missionary seeks to understand the native man and to enter into a sympathetic relationship. He denies himself all the multitudinous opportunities that a new area may offer in way of personal gain, through the use of his expert knowledge of native needs, and devotes himself to an unselfish service. The trader may sell rum, or buy labor, or take advantage of ignorance to charge ten or fifty prices for materials that are really of little worth, but the missionary warns against such nefarious traffic and teaches the victim of it how to supply his own needs. Chulalongkorn, the late progressive king of Siam, said, "The American missionaries have done more to advance the welfare of my country than any other foreign influence." "The missionaries are doing more for the civilizing and educating of the masses of the East than any other agency whatsoever," said a British M. P.

The missionary can not be a political emissary. He does not interfere in matters of government, but he can intercede. His intercession has been denominated interference by those who found their selfish designs frustrated, and it is to such as them most of the charges against missionaries can be traced. In savage lands he is regularly called upon to intercede for the poor victims of savage injustice. He rescues slaves, saves women from cruelty, children from desertion, arbitrates in personal disputes, and advises those who plead for a better order of things. He goes to soften asperities, mould hearts to a love of community peace, found ideas of democracy, and give

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new well springs of action. Through these things he exerts a vast, indirect influence upon government and society. He rarely joins the revolutionaries, but the lessons he teaches compel progress, and there are times when the masses must suffer death or fight for their right to live in peace with their new ideals; such times are rare, and the arts of peacefulness the missionary uses usually prevent any outbreaks of violence over his revolutionary principles. In Korea all missionary influence was against armed resistance to Japanese occupation; it would have been suicidal, and the experienced missionaries thought the better way was to submit to the inevitable and move for the best possible terms in equity and native right to a part in public affairs. This was not done on behalf of imperialism, but on behalf of peace, the saving of life, and a more secure freedom in the future.

In implanting ideas of democracy and personal right the missionary roots into the hearts of men influences that make it impossible for them to submit supinely to oppression and injustice. The leaven of ideas ferments the lump, and men come into their own. The Christian community becomes a sort of Puritan nucleus in the old society; it stands for justice and righteousness, and human nature responds to the call for more benign rulership, once the possibility of its realization is shown. In a savage tribe any progressive is liable to be fixed upon by the witch doctor as a danger to his dread power, and made to suffer for any innovations; if in a more cultivated, though static civilization, he is feared as an innovator who threatens revered customs, and does violence to

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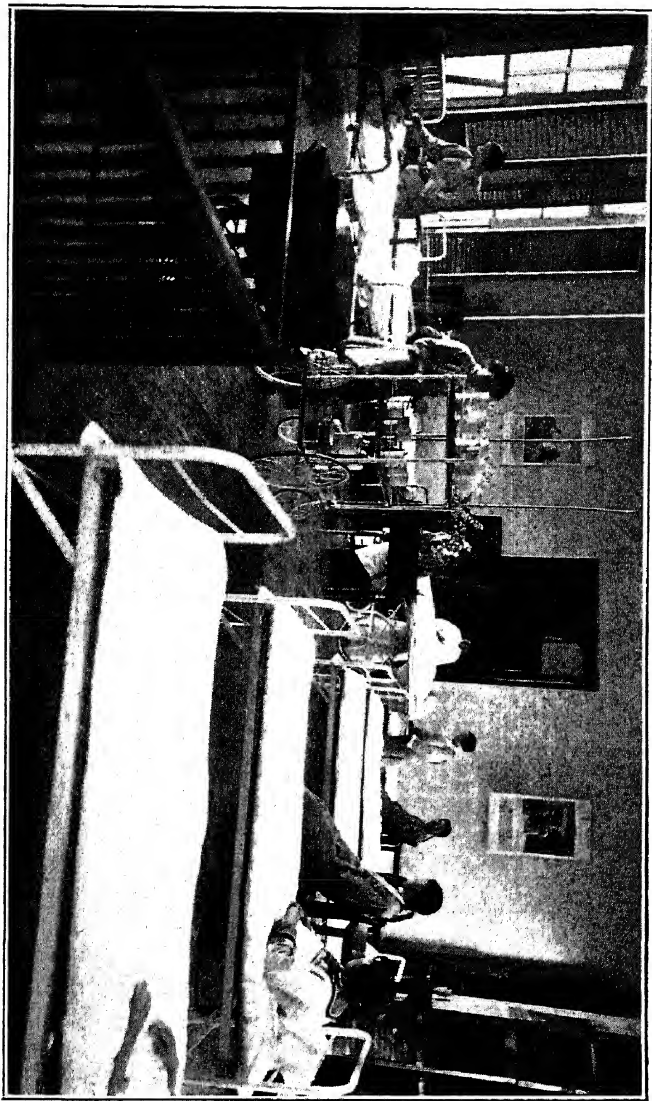
the memory of the fathers and sages, and is quickly suppressed or violently put out of the way. The late Empress Dowager, before she accepted the inevitable through the failure of the Boxer rebellion, had sundry editors executed by slicing them up a few inches at a time, because they dared turn reformer, and the young emperor is known to have been a royal prisoner until the day of his death.

The cultivating of ideals of democracy and personal right lift a people into self-assertive integrity, and they evolve for themselves a better order of political and social life. Efforts to force upon them things that may be for their benefit, but for which they are not prepared, and which they do not understand, are liable to be disastrous. This is the danger of colonial rule. Superstitions, traditions, and ancient customs are deeply grounded into their nature, and it is more than the task of a day to uproot them without destroying the community life. Poor bonds as they may be, they are nevertheless the bonds that give a social control, and with all their evils society will disintegrate if they are crushed without substituting better.

It has been charged that the missionary, by taking white contact, takes ultimate death to the primitive peoples, that clothing and industry are their enemies, and that changed habits unfit them for their environment. Where the missionary has been left to create his new order without the interference of other whites, there has been a steady increase in population. Such isolated islands in the South Seas show from one to three per cent increase in numbers annually. The

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charge that the Hawaiians are dying out is refuted by missionaries who have lately made a thorough investigation of the subject; they are not only increasing in numbers, but in wealth, and in their interest in Christianity. Where governmental interference has modified the efforts of the missionary to create a self-supporting people of initiative and industry, by making them recipients of lands they did not need, and of pensions they did not earn, encouraging them thus to live in idleness, they have not kept pace with civilization; most of the American Indians and many of the Maoris of New Zealand are examples of this, though there are many individuals who have arisen to places of influence; Maoris sit in the legislature of New Zealand, and there are instances of American Indians arising to prominence in scholarship and statesmanship. Even where the white race has brought its wholesale influence for good and bad, and contributed so largely of the latter, because the ignorance and child-like character of primitive peoples afford little resistance to the barterers of vice, there are virile qualities of racial character that withstand the contact. There are races in South Africa that have increased population from double to quadruple former numbers in a single generation. It is another pledge of missionary efficiency to learn that these peoples are those which he reached before the trader's caravan came, and that his ideals of temperance and personal integrity had taken hold. Civilization goes by war, politics, trade, or missions. Missions do not claim to be the only civilizing influence, but they do claim to be the most fundamental and unselfish. The missionary is the



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only white man who goes for the first time to a barbarous or other alien race for the express purpose of being their friends, and he is the only one of the above envoys that carries with him a confidence that every race can be elevated to a plane of self-sufficiency, and that the benign influence of personal service is the greatest force for the task. All the others, historically, have made subject peoples, and exploited them for gain; the missionary alone vicariously bears their burdens and has faith that they will become sufficient unto themselves by instruction and experience. He does not deny the power of politics and trade, he welcomes them, but he would not deliver any people over to any influence that would make mart of them, or fail to bring good tidings of peace. His implanting of the fundamental principles of manhood and social good carry his influence into all those more remote, though inevitable movements of government, law, commerce, and material advancement that follow an awakened consciousness and are used in the making of an era of progress.

2. THE POLITICAL INFLUENCE OF THE MISSIONARY.

The missionary creates a new type of citizenship. Like Paul of old, he is loyal to the powers that be and renders Caesar his dues, but his great purpose is that God shall have his portion. His work is the creation of a sense of personal freedom and of social responsibility, and the putting of a good conscience into all men. Non-Christian governments are generally arbitrary; there is little sense of citizenship; rule is from above, and governments do not derive just powers

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from the consent of the governed. All arbitrary rulership partakes of the tyrannical, and, though democracy has its corruptions, oligarchies are notoriously for the benefit of the few. Buckle says no man ever received great arbitrary powers without abusing them. In China all centers in the emperor, who is "The Son of Heaven," and theoretically, the father of his people; each province has a viceroy, who is, if a strong character, all but supreme in his state; under him are a series of officials, each with absolute powers in his realm, and accountable only to the man next above him; there are nine grades of these officials, reaching from the emperor down to the local magistrate. The local magistrate is a petty despot over the populace; to them he is virtually king, and his authority is supreme, save as exceptional appeal may be made over his head. The Chinese were taught a certain peculiar sense of democracy by Confucius, and appeal and rebellion are the final resorts. This absolute officary is notoriously corrupt. As one of them told a traveler, "We are all worthy of execution, but if the emperor took off our heads, the next set would be as bad." The fault is in the sense of citizenship. In the mission churches the membership learns the rudiments of self-government and acquires a democracy of spirit that makes them prize it. The Viceroy, Tuan Fang, declared that "the awakening of China may be traced in no small measure to the hand of the missionary." He planted the seeds of the new order, and in his education of youth gave a sense of freedom of personality, and of responsibility for the universal welfare, that creates a genuine

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patriotism. Arthur Smith says the Chinese had no real sense of patriotism in former days; all officials were looked upon as public parasites and a necessary evil; the spirit of the people was that every man must look out for himself at any odds, and as a result government was not a public concern so much as a necessity that had to be endured, and in which each would do well to make the best of it for personal benefit. To-day the new patriotism has taken hold of the educated young men with the power of a religious zeal. It was given inception and has been cultivated in all mission schools, and every influence that the missionary could bring to bear has been in its favor. It is not confined to port cities and places where China has come into contact with material civilization; the west of China is furnishing many of the most progressive men, and is believed by residents in that section to be responding even more rapidly than any other to the call of the new era. "The missionaries," says Tuan Fang, "have borne the light of civilization into every nook and corner of the empire." Dr. Yen, Secretary of the Chinese Legation at Washington, gives "a large part of the credit for instituting this wonderful educational movement to missionary enterprise and foresight." Of missionary influence in Japan, Prince Ito said, "Japan's progress and development are largely due to the influence of missionaries, exerted in the right direction when Japan was first studying the outer world." The work of Guido Verbeck has already been noted. The fact that the emperor conferred signal honors upon him and that the government buried him with all the tokens of national respect, testify eloquently

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to his part in its remaking. He has been called "The Father of the Japanese Constitution."

The missionary exerts a direct influence upon rulers in many cases. The makers of the new Japan made Verbeck's home their refuge for councils. Dr. Underwood's parlor, in Korea, was the scene of many conferences of the foremost men of the kingdom in the days of transition. Both these men, and many others, thus became privy councilors of the reform party, and to their credit always used their positions to exert an influence that would make for peaceful revolution; they were teachers, not political leaders. When Verbeck was allowed to do nothing more than teach English, he used the New Testament and the Constitution of the United States for his text-books; the lessons were not lost. The Christian literature societies have sowed the seed of all progressive ideas of enlightenment through their translation and distribution of books, and counted that by such indirect methods they were doing real missionary work through doing good to humanity, bringing the revolutionary forces of new ideas into the minds of the leaders of a nation. The late Emperor of China was made a reformer through books supplied by the Society for the Diffusion of Christian Knowledge, and his chief adviser, the great reformer and exile, Kang Yu-Wei, said, "I owe my conversion to reform and my knowledge of reform to the writings of two great missionaries, Dr. Timothy Richard and Dr. Allen."

In barbarous lands the influence of the missionary is as much more direct as the need is greater and the enlightenment of the ruler less. "Savages are made

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into law-abiding citizens by missionaries better than by any other process," said the Governor of New Guinea. A British Commodore in the waters of that same savage island said, "These gentlemen have established such a hold over the natives as many a crowned head would be glad to possess." Once the missionary gains their confidence, he becomes an all-powerful influence in their tribal life. He is called upon to settle disputes between tribes, and wards off many a bloody battle. The history of heroic, personal interventions on behalf of peace would fill an inspiring volume. Savage justice scarcely deserves the name; it is fraught with arbitrary judgment, if not with trial by some process of superstition instead of upon the merits of the case, and the accused is regarded as guilty until some fate established his innocence. The missionary intercedes for justice and teaches the arts of its administration to the chieftains. In the South Seas they wrote whole codes, notably in Tahiti and Raiatea, and saw them adopted by the voice of chieftains, and approved of the people. Ex-Secretary John Foster said that the political reorganization of those islands was almost entirely the work of missionaries. Whole communities were persuaded to move from low to high lands for the sake of health, were reorganized in government, given a better type of architecture and agriculture, and persuaded to write permanent pacts of peace with ancient enemies. In Africa the missionary has to his credit several reformed governments among savage tribes, any one of which would be well worth the whole missionary exertion in that continent. Khama the Good is one

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of the notable names of native African history. His government of the Bechuannas has been a model in primitive control. He abolished slavery, polygamy, and concubinage, established industry, absolutely prohibited intoxicants, and set up courts that substituted justice by fair trial in place of the old barbarities of trial by ordeal and the whims of the witch doctor. There has been no war under his administration, whereas before war was the chief business of the people; the traveler has been made safe anywhere in his realm, and trade is carried on with even more sense of right on behalf of the black man than on behalf of the white man, who all too often comes prepossessed with the idea that he is a superior being, and that it is "no harm to cheat a nigger." The story of Coillard's influence over Lewanika is but little less thrilling than that of Moffat's over Africaner; from a bloody and drunken despot he was converted into a sober, just ruler, and though not professing Christianity openly, as Khama and Daudi have done, he lives well up to its ethical code and has transformed his country. The transformation of Uganda has been spoken of heretofore. The influence of the missionaries has reached on out to the west of Uganda and made quite as notable conquests. Daudi, king of Toro, is one of the most remarkable of African chieftains. He has led his people into new ways of peace, and preaches Christianity both to them and to neighboring tribes. He has gone to those with whom he was perpetually at war, and, in the name of the new peace, exhorted them to accept his way of life and government. Many such narratives could be given

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of South Sea chieftains. Thokambau, of Figi, was one of the most notable in missionary annals. He was a man of exceptional forcefulness and had used his power up to the limits of savage brutality. The list of his victories and of the horrible feasts he had provided from bands of prisoners taken was long. He lived for a quarter of a century as a Christian ruler, and saw the new order established over a citizenship that could read and write, and that worshiped the God of peace in peace. Often he looked upon the orphaned and the widowed whose sad fate was of his making in the days of his savagery, and wept in pleas for forgiveness. It is the glory of the missionary that he was able, in most cases, to bring about the change without bloodshed, though there have been times when the party of reaction and savagery, because they were the beneficiaries of the inequalities and cruelties of the old system, have made war upon the party of peace and progress. In such times the cause of right had to be defended, but victory was ever celebrated with forgiveness and an effort to win the vanquished to the better way.

Loyalty and a better type of citizenship is ever the missionary's aim. When the powers were threatening to partition China, the missionaries were fast friends of the empire and gave all influence to its maintenance. During the war with Russia the missionary body passed strong resolutions of loyalty to Japan. They were among the first to advocate repeal of "extra territoriality." In India they have ever plead the cause of the people, if not according to the ideals of the more radical political elements, at least on behalf of justice to the native and a humane administration of law.

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British administrators give them credit for suggesting many emendations of law that were for the popular good, made possible through their thorough and sympathetic understanding of the common life. In Korea they exerted all influence in favor of a purer government, and native Christians refused to submit to the demands of corrupt officials, though they scrupulously obeyed the law and paid the legal tax. Their action was strong in calling attention to official corruption, and when the revolution began it was held on its course through the influence of a club that was predominantly Christian, loyal to the king, and persistent in its demands for reform at his hands.

The missionary is not a political emissary, but the welfare of a people is so intimately bound up with its political destiny, that in influencing them for a better manhood and more humane ways of life he must indirectly, at least, influence their political destiny. That influence is positive for a larger participation of the common people in government, and, through the popular education given in mission schools, there is raised up a generation of men who are able both to obtain it and maintain it. The missionary does not go to create republics, but he does go to create a citizenship, and whether the form of government be republican or monarchical, it must be more democratic as the masses rise in intelligence and personal responsibility, and the change will always be ushered in by the arts of peaceful revolution if the influence of the missionary is dominant in the councils of reform.

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3. MAKING TWO BLADES OF GRASS GROW WHERE ONE GREW BEFORE.

Booker T. Washington said that if he had to choose between sending his graduates to Africa to preach salvation in another world, or to teach the natives how to make two blades of grass grow where one grew before, he would choose the latter. He believes that it does little good to preach an otherworldliness and leave men in the old sordid environment of this present world. Fortunately there is no such alternative. We no longer hear the plea that we must hasten to the heathen because so many millions are plunging annually into an eternal abyss of fire. Not more than twenty years ago some of our greatest boards made belief in that sort of doctrine an essential in a missionary candidate. To-day we go, as Dr. Clark puts it in his little volume on "A Study of Christian Missions," to "plant" rather than to "rescue." Jesus did not come merely to save a few out of the world, but to save the world. So the missionary goes to save individuals and through them to save a world, and he has faith that the little band of "Jesus men," as they are generally called, will be the saving salt of society. Everywhere he makes two blades of grass grow where one grew before, and, increasing the capacity of men to appreciate and use the material factors of civilization, he builds up a self-supporting society of more advanced grade, and creates an environment that makes it possible for them to enjoy the benefits of progress.

The missionary creates new wants. Without the desire for things not yet possessed, the more primitive

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and backward civilizations could not be lifted beyond their present attainments. The primitive man is not a creature of many wants; he is satisfied with provision for immediate needs, therefore he is not industrious. The chase and warfare seem to him more direct means of satisfying his desires, so he resorts to those sporadic and cruel arts and despises the cultivation of nature as the work of those who can not fight and hunt. This indignity done, the art of labor condemns woman-kind to the status of a slave, military necessity creates despotism, and the tribe is condemned to penury or starvation, if it be not successful in its barbarous enterprises. The missionary changes the ideals of economy and substitutes honest toil for rapine, teaching the native that it is easier, and much more sure, for him to cultivate nature and become the recipient of her lavish gifts than it is to prey upon man and wild beast, and put his livelihood under a gamble of luck, or at the stake of battle.

Among primitive peoples especially this lays upon the missionary the necessity of training whole populations in the arts of industry. The work of industrial schools has been treated in a former chapter. The industrial work of the missionary is not confined to that of the industrial school; it is limited only to the industrial needs of the Christian community he founds. The poverty-stricken methods of industrial economy must all be revised and the implements of more progressive ways introduced. We have already seen how thousands of plows were introduced into the fields of East Africa by the Livingstonia, Blantyre, and Zambesi missions. The same thing was done in India, and

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small American plows replaced the ancient pointed stick by tens of thousands. The missionary adapted looms and cotton gins to native necessities in India, and introduced them into Africa together with the cultivation of cotton. The Scotch mission on Lake Nyassa started coffee growing, and wheat was introduced into Uganda, New Zealand, and in many other fields. In India a superior method of milling the grain was taught and the machinery necessary brought from abroad by missionary hands. In China many missionaries have become especially interested in problems of agriculture, and have given to the hard-working and economical Chinese farmer methods of intensive cultivation that have made work much more productive and life by that much less hard. In semi-arid lands he has taught the arts of irrigation, and in China improved the wells and canals that had been used from time immemorial for the watering of the fields. In Assam tea culture was begun, and orange growing was taken to the South Seas. A partial list of the edibles introduced in various lands will give some idea of the scope of his industrial activities in the task of giving peoples a better chance in life. He has transplanted oranges, limes, mangoes, cocoanut palms, cocoa beans, pine-apples, coffee, cotton, tomatoes, wheat, barley, corn, and almost every other edible adaptable to the land in which he happened to find the necessity; he has transported cattle, builded boats, laid out roadways, constructed houses, moulded brick, dug canals, cultivated fields, established mercantile houses, and contributed every art of material progress as an aid to his beneficent work of creating

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a civilization. The Zulu mud hut became a neat, square cottage, with tile roof; the Syrian hovel became a two-storied house with chimneys where before the smoke had escaped through a hole in the thatch, and with tiled floor, where before there was only a hole in the mud wall; the South Sea common shéd, where from forty to sixty persons of all ages and both sexes lived in common, was changed into separate family houses; Hindu villages have been so changed that travelers can always tell they have felt the impress of Christianity. Peoples who roved from place to place, following the luck of the chase, have been induced to settle into stable communities and till the ground for a living, substituting substantial dwelling-places for the bed of sand and the shelter of bower or cave; the sheet iron stove has been substituted for the charcoal brazier or the brick oven in which weeds and grass were burned and warmth given the limbs of little children that had suffered severely with the only slightly tempered cold of closed and stifled rooms.

The missionary has developed native products and created new types of native implements and put peoples on their own resources. In the South Seas he discovered the uses of arrow-root and taught the native how to make it one of the staples of life. He dug wells and showed the wondering savages how to quench their thirst when there was no rain, and moved plantations back from the miasmatic lowlands of stream beds to the healthier uplands. He has induced communities to remove their villages from sandy and arid lands to richer soil by adapting novel products to their native arts of cultivation. It is claimed he in-

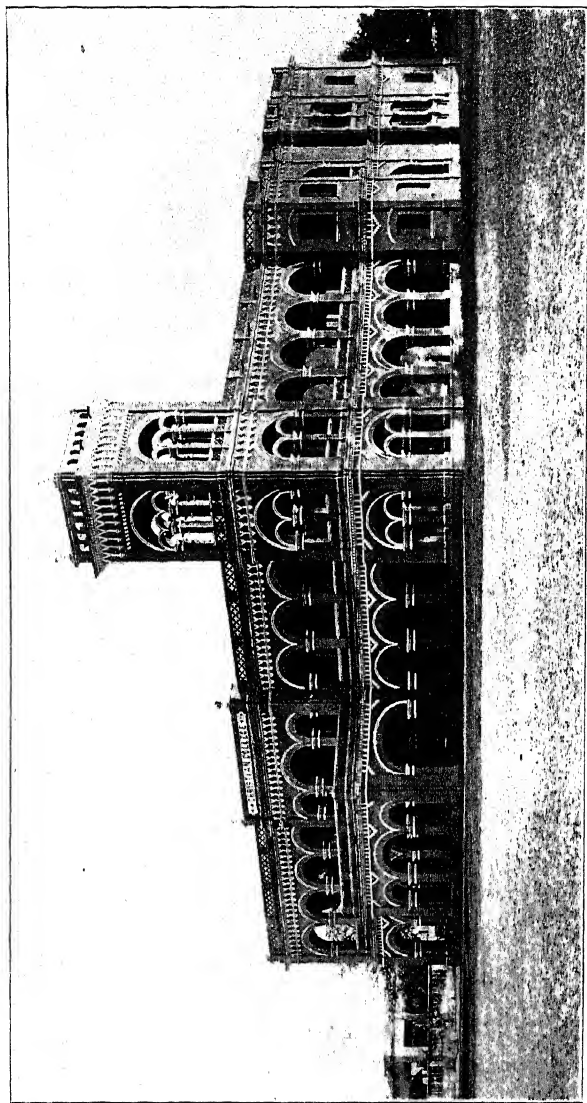
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vented the jinrikisha, and thus gave Japan its chief vehicle. The Khaki dye is one of his African discoveries, and many medical remedies can be traced to his study of botany. He produced a movable type for Japanese character and invented typewriters for the Burmese and Chinese, the latter with four thousand characters on its type wheel. John Williams taught the South Sea Islanders how to build ships, and they became quite adept, substituting vessels of several hundred tons burden for their old "dug-outs." In East Africa Mackay built some two or three hundred miles of roadway and thus began the innovation that has replaced miles of winding native paths with excellent roadbeds. The Lake Nyassa mission builded the famous Stevenson road joining Lakes Nyassa and Tanganika. Everywhere his effort has been so to create the arts of industry, the desire for a better manner of living, and so to develop native resourcefulness that every community would become self-sufficient, able to provide for its own higher wants, or so to contribute to those of other places that trade would bring all the means for a better manner of life, and thus allow the stable attainment of those higher intellectual and spiritual states which are conceived to be the goal of life.

As the material adjuncts of better living depend upon the creation of new desires, so their use and maintenance depend upon the building up of a sense of honesty, of community service, the practice of the golden rule in business and industrial relationships, and the necessity of economy and self-dependence. The common people of India, like our negro masses

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in the South, live on credit. They are forever in debt, and the usurer is pitiless; the lowest rate of interest is one per cent per month, the average annual rate is from 20% to 30%, and often runs as high as 70%. In China and Moslem lands the rate will run from one to three per cent per month, and in Siam it runs up to 100%. There is literally no limit upon the power or avariciousness of the native money lender, and he enforces his legal rights with Shylock severity. The debtor's prison is a crushing institution, and slavery is the nemesis of the hopeless debtor. The missionary cultivates a thrift that escapes the usurer, and, where necessary, founds savings institutions, co-operates with the government in inducing the people to use Agricultural Banks, or adopts the English Provident Societies as means for defeating the all-consuming dragon of interest. Retail trade is a process of haggling over prices and rests upon the theory that one must get, not what an article is worth, but what another may be induced to pay for it. The missionary lends all influence to more open and scientific methods of commerce, and to the cultivation of that trust of one another that makes trade one of the constructive arts of a civilized life, instead of a barbarous method of taking advantage of necessity. In numerous instances the native Christian has built up a renumeration business by practicing the simple arts of open dealing, making every article just what he represented it to be, with the price plainly marked upon it. By elevating the moral standards he cultivates a character that is able to appreciate the benefits of a more progressive material civilization, and by



Reid Christian College, Lucknow, India, illustrating the most attractive type of native architecture—used in educating a progressive generation.

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introducing the arts of a more progressive material civilization he fortifies the moral and social life he has planted with an environment that sustains and upbuilds it.

4. THE PIONEER OF CIVILIZATION.

The missionary is the pioneer of civilization. He discovers new realms, explores unknown regions, opens trade routes, establishes friendly relations with barbarous and hermit peoples, and cultivates a universal desire for the arts and goods of civilization. The Chinese Ambassador to the United States calls him "the frontiersman of trade and commerce." The emissaries of world trade have gone to the Orient prejudiced against him, and returned to proclaim him "the advance agent of business," and the greatest benefactor of the Orient. A certain commercial man went to China with all the prejudice a materialistic mind and an ignorance of missions could create; in Shanghai he drank a toast to commerce and proclaimed aversion to the missionary; six months later he returned to the same club to praise the emissary of Christianity as the choicest product of modern civilization, the harbinger of all progress, and the greatest asset that commerce possessed in the Orient. He is not a "drummer," nor does he go with any avowed attempt to open trade routes, or act as an advance agent for Western commerce. But so surely as he elevates a people he creates within them the desire for things that civilized industry alone can produce, and by piercing new lands and exploring unseen regions he opens avenues for the trader. He has little interest

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in trade as such; in fact he often finds the frontier trader his chief enemy, for he deals in rum, firearms, opiates, and much useless material, and generally takes sinful advantage of the guilelessness of the primitive man. True exchange of commodities is one of the promoters of civilization, and between it and the missionary cause there is a large community of interest, but the brutal trade in men, known as the "Kanaka traffic" in the South Pacific Seas, the "red rubber" commerce of the Congo with its unspeakable oppression and brutality, the opium trade in China with its resultant "Opium War," the merchandise of cocoa and its accompanying slavery in Portuguese West Africa, and the universal decimation from rum wherever it has been taken, constitute a series of evils for which civilized powers can make no apology. The missionary has heroically protested against all these evils. John G. Paton labored arduously to obtain the international agreement protecting primitive peoples against the export of rum and firearms from civilized lands. The missionary body in China have always protested vigorously against the enforced opium trade. Two missionaries, Drs. Morrison and Shepherd, at risk to their work and their lives, and by submitting to arrest and harassment, were influential in bringing about a change in the governmental supervision of the Congo regions that promises to abolish the oppressive system of taxation and the cruelties of "red rubber." The missionary protest against the "Kanaka traffic" in the South Seas brought stringent laws against it, and finally abolished the whole system of indenture upon which it hung. Wherever white men have traded

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in the flesh of the blacks, the Protestant missionary has been at enmity with him. The work of Livingstone in abolishing the slave trade in Africa needs no rehearsing here. He declared he went to open roads for commerce and missions, and to substitute trade in commodities for the universal African trade in men. The result was that African Companies were formed. British naval vessels patrolled the African coasts in quest of Arab slave dhows, and new forms of currency were introduced in place of the old standard of exchange, which was expressed in the value of a slave.

Civilization brings new wants, and new wants mean exports. Dr. Dennis says a careful estimate made by Englishmen, the greatest of all world traders, was that every pound spent on missions brought back ten pounds in commerce, and quotes another authority as saying that "when a missionary has been on the field twenty years he is worth \$50,000 per year to British commerce." A study of African communities showed that after they were Christianized they used ten times as much merchandise as before. To teach a million people to wear clothes means an immense trade in cotton, and to persuade them to keep their clothes and faces clean brings demands for soap. When missionaries first went to Syria there was not a window glass in the country. They introduced both window glass and stoves, and nearly every house in Asia Minor is now supplied. The trade in plows in Africa and India has already been noted. The statistics Dr. Dennis gives of trade in the South Seas totals millions annually, and is directly traceable to missionary labors. That of the Lake regions of Africa is no

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less due to missionary pioneering and the transformations wrought in the desires of a barbarous population. Wu Ting Fang wittily remarked that if we could induce Chinamen to lengthen their shirt-tails one inch it would make the cotton-growers of the South rich. The missionaries to China have opened museums, illustrating the material and other achievements of civilization, and as many as 100,000 have passed through their doors in one year's time. They have established "model stores" to introduce those implements of progress that would be of profit to their communities and conducted them, without an eye to profit, until normal channels of trade could be opened. Many mission schools have business departments for the training of the youth in the ways of upright commerce, and every school gives instruction in the things of universal interest, the life and work of the world, and the advantage of open communication with all mankind.

The missionary has not laid down railroads, but his work has expedited their construction. The first successful train traffic in North China was conducted along a route where there had been a line of mission stations for twenty years; other roads were angrily torn up by the coolies and their friends, who saw a single locomotive doing the work of hundreds of men. The missions had so made for progress that the people were ready for the innovations it brought. To-day there are 6,000 miles of railroad in China and as much more projected; the Chinese will probably be the greatest railroad builders of the century. Africa will ere long be traversed both from east to west and

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from north to south by direct lines of rail and steamboat traffic. It was the missionary, Krapf, who first designed an eastern to western route by means of a transcontinental line of mission stations, and Bishop Gray dreamed long before Cecil Rhodes of a Cape to Cairo route by means of a continuous line of mission stations and traversible roadways connecting them. It was Mackay who first suggested the Uganda railroad. Wherever the missionary goes the trading-ship, the railroad, and the telegraph follow in course of time. He is not the sole creator of trade routes, and in some instances the trader has preceded him, but the rule has been that he pioneered the way, and it has ever been that he first found that way into the hearts of the people which Stanley called the greatest achievement.

Where there has been no open means of trade, or no honest means at hand, the missionary has founded trading companies as adjuncts to his work of creating a civilization. He has never conducted the commerce himself for the advantages of profit; if it was necessary to establish a commerce he did it as a means to his one task of converting men to Christianity and building a civilized community in which they could retain their new-found life, and he relinquished it upon the first opportunity that offered. The Uganda Company, the Scottish Missions Industries Company of the Blantyre Mission, the Livingstonia Trading Company of the Livingstonia Mission, the Papuan Industries of New Guinea, and the Basle Mission Trading Company are instances of commercial auxiliaries formed by missionary men, independent of missionary so-

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cieties, and for the specific purposes of working in harmony with missionary activities. Their purpose is to give the natives a social environment in which they can develop Christian character, to enable them to become independent, to make the mission self-supporting, and to protect them against unscrupulous traders. These companies superintend plantations, develop the cultivation of sugar, cotton, coffee, and rubber, make bricks, build houses, transport goods, build lake vessels, construct roads, and give all possible financial and instructional encouragement to natives in the building up of independent farms and businesses of their own. They are typical examples of philanthropy and five per cent, with great emphasis upon the philanthropic part of enterprise. They furnish models in business enterprise and examples in business integrity. Josiah Strong advocates a plan to send superior Christian young men to the mission fields as merchants, commercial men, investors, and superintendents of all manner of enterprises conducted there by the whites. He would make them an antidote to those worshipers of mammon and devotees of materialism that go with a spirit of adventure to the conduct of such enterprises, and also a positive force for the introduction of Christian ethics into those commercial relations that so often afford difficulties to the non-Christian mind in its wrestle with the appeal of the missionary.

The missionary is a maker of men and civilization. Among the necessities of his work are the arts of material progress. He needs them to supply the newly awakened wants, and to furnish an environment in

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which the awakened lives of men can find safety. Sir Hiram Maxim, an advocate of materialism, wrote a virulent attack on the missionary; he used unbecoming language even in the violence of his prejudices against both the man and his method. The Chinese Courts have interdicted its circulation in China, one of the judges on the Supreme Bench at Shanghai saying, "I never read such balderdash." There is no conflict between honest commerce and the missionary, nor between the arts of material progress and his work of awakening the souls of men. Commerce and politics owe him a vast debt for his work of exploration, of creating new wants, of opening closed and savage lands to civilization, and for his transforming and peace-making evangel.

5. THE MISSIONARY AND UNIVERSAL PEACE.

The dominating world movement of our time is that toward universal peace. There has not been a great war between Western nations in the last generation. To-day there are no less than sixty arbitration treaties in force, and such international agreements bid fair to grow rapidly, both in number and in the scope of their provisions. The nations are drawn together with numerous common agreements; the Navigator's Code is used by forty of them alike, and the International Postal and Telegraphic Union includes fifty-five. International conferences include every conceivable question that is of common concern, from a general conference on morals up to the Inter-parliamentary Union and The Hague Tribunal. The Central American Peace Union is an actualized ex-

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ample of enforced conciliation through judicial procedure. The Hague Prize Court bids fair to become the nucleus of a universal court of arbitration. The American Bureau of Republics, including twenty-one nations, is so educating the Americans on the commonality of their enterprises that war will become impossible as public opinion receives education. The Red Cross is an unofficial, but none the less real, international bond. International law is becoming a recognized code that will demand a court, and rules of war have the force of international legislation. The neutralization of territory is one of the most signal signs of a "Truce of God" in our times. The Baltic and North Seas are now neutralized in the interest of common safety, and various ones of the smaller nations are guaranteed against attack by the power of stronger governments; such is the case with Switzerland, Belgium, and Norway.

The growth of common knowledge, the widening sympathy that a more universal education brings, the common interests of an international commerce that is making the whole world one vast trading mart, the rising intelligence of labor and its awakening to the fact that it bears all the burdens in the end, the tendency of all legislation to take on a social cast, and the evolving spirit of humanitarianism, all make mightily against warfare. The ideals of one age work out into action in the next. Kings and diplomats can no longer make war. "The people now, not governments, make friendships or discord, peace or

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war, between nations," said Secretary Root. It is gratifying to have Secretary Yen, of the Chinese delegation, declare that "There is a public opinion in China now that makes itself heard," for it has been the fear of the West that the Yellow man would arise to avenge the wrongs done him. If it is left to public opinion there will be no "Yellow Peril," for the masses of China are peaceful by nature and through long habit. "They believe, philosophically, in the right so thoroughly," said Sir Robert Hart, "that they scorn to think it requires to be enforced or supported by might."

When we turn to the other side of the question and see the vast preparations constantly being made for war, we wonder if there is any real promise of its cessation. The world is staggering to-day under a vast war debt of \$35,000,000,000, and goes on spending no less than \$2,000,000,000 annually on preparations for battles they hope will never come. There is yet a "military party" dominant in most of the nations. Russia runs up an annual deficit of \$75,000,000, but makes plans for a billion dollar navy. France, Germany, Italy, and even England, are in debt until the interest alone is a great burden upon public revenues, and the wages of the laborer are so low as to forbid him the promise of a competence in old age. Even the United States spends hundreds of millions yearly on her army and navy, though she possesses that "magnificent isolation" which ought to take her out of the suspicions of old-world complications. Her population has increased 85% in the last thirty years, her

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wealth 185%, and her expenditures 400%, two-thirds of it for a military budget. Might we not cry with Katrina Trask:

“Peace is not peace that sings its battle songs,
And sets its cannons on a hundred hills;

Peace is the great affirmative of God;
It knows no armies, arms or armaments;
For armies, arms, and armaments deal death,
And peace holds conquest in the strength of life;
Its crown immortal is unconquerable.

Cease to build battle-ships and death's grim enginery;
Cease to pay tribute to the god of war;
And cease—O Pharisees—to pray ‘Thy Kingdom come,’
While you are voting means to make a hell,
In some vain boasted cause of righteousness.”

Commerce and politics have been the fruitful sources of most modern wars. The accusation that missions have been the cause of conflict is easily refuted. In China the Boxer rebellion afforded opportunity for much materialistic and misanthropic misjudgment of missions. That rebellion involved missions only because they were foreign, not because they were religious, or because of any direct opposition to the missionary as an emissary of Christianity, or an opponent of native faiths. Missions is the one world movement of our time that stands unalterably

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opposed to warfare. One nation might listen to the demands of commerce and compel another to open its ports to trade; political consideration might compel the opening of a land like Tibet; but missions never asked for force to open Tibet or any other closed land, though they might wait, like the lonely Moravian at his outpost in the Himalayas, thirty years for the day to come when he could enter in with his message of human good, or like Peter Rijnhart, who was martyred in attempting to win Tibet's friendship, give his own life in an effort to show a hermit folk that the missionary would bring them good if only they would let him come in.

The missionary has brought peace to vast populations that knew no other manner of contact than that of strife and bloodshed. In the South Seas whole tribes were won from the decimating terrors of inter-tribal strife to a peace that has not been broken in two generations. The Fijians number more than 100,000 souls, and a more peaceful land is unknown; John Hunt found them living by war and cannibalism. The Battaks of Sumatra number 50,000, and are to-day a nation of cruel, superstitious, warlike folk, won to the gentle arts of peace. The Sarawaks were among the most dangerous and thieving of aboriginal peoples; an English traveler says that to-day a traveler may drop his portmanteau anywhere on the pathway, ramble in perfect peace where a few years ago his head would have been taken, and return to find his goods untouched. The Zulus were perhaps the ablest and most competent militarists ever discovered among primitive peoples. They had a regular military, or-

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ganization with companies and corps, and a military law. Their fighting qualities are the equal of any living race, but they were won to arts of peace by the missionaries before the white trader made inroads upon them. In Uganda, Mackay found Mtesa ruling a well organized primitive state. His army, with its regularly constituted series of chieftains, was anything but a savage horde of undisciplined raiders, and was used to prey upon weaker neighboring tribes in a vast slave trade that counted its victims by the thousands. To-day Winston Churchill says he never traveled in a more law-abiding, peaceful land, and lays his tribute of praise upon the head of the missionary.

Wherever the missionary has gone he has been a force for conciliation between the intruding white and the native peoples. He has stood between the arrogance of the colonial administrator or the pioneer trader and the rights of the native races, and his intimate understanding of the native mind and custom has been a source of information to governors who desired to do the best by their primitive wards. Sir Mackworth Mackenzie, Lieutenant Governor of the Punjab, said the lives and teachings of the missionaries are the most potent influence working there. Our first ministers to China found the missionaries indispensable to their work and testified that without them, with their use of the native tongue and their sympathetic knowledge of the native mind, their work would have been impossible. Without a single exception these ambassadors of the early days became warm defenders of missions, and especially of the missionary, as a force making for peace between the

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nations. It was S. Wells Williams who wrote the "Toleration Clause" in our treaty with China, which was later put into that of England also. He also brought about the "Most Favored Nation Clause" of our treaty with Japan. Dr. Dennis cites numerous specific instances of such direct influence of the missionary in international relations. Missionaries have accepted consulates and sat on government commissions because of the opportunities offered to prevent friction and cultivate comity. Dr. Allen became our first minister to Korea and was a dominant influence in the peaceable opening of that closed land to civilization and contact with the world. Verbeck sent a Japanese commission around the world and opened their eyes to its marvels, resulting in a quick opening of the land to all the influences of civilization, and a proclamation of absolute toleration. The missionary has ever stood for the essential oneness of races and nations; admitting the vast difference in attainments, he believes in the potentialities of even the least among men, if only they be discriminatingly educated and trained through the long period it must take to raise up a civilization. "All conclusions based upon the assumption that the status of a race at any particular moment is to be wholly or largely explained by the physical characteristics of that race, turns out to be an illusion," says Lord Weardale, President of the Universal Races Congress.

Kipling may sing that "East is East and West is West, and never the twain shall meet," but the missionary, pre-eminently the world's cosmopolite, out of his rich experience and sympathetic understanding of peoples, his scientific study of the psychology of

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racial minds, his explorations into the sociology of all mankind, and his experiments in the creation of civilization, believes that there is a broad and deep foundation of universal human experience that warrants him in contending for a world order of peace and interracial communion that will adjust all difficulties, assure every people of their own independent opportunity to life, liberty, and the pursuit of happiness, and make all mankind one of kin. Peace is bound up in an attitude of mind more than in any external arrangements that can be made. The missionary cultivates that attitude of mind in his instructions in fraternity, his breaking down of provincialism and sectionalism, his demand for equality of human right, his inculcation of a universal religion of humanity, and his presentation of one Father God to all men. Principal Fairbairn said that to have realized Plato's Republic would have ruined humanity. To realize Christ's Kingdom of God alone will save all humanity to peace and fellowship, and lift up that very class whom Plato deemed it impossible to elevate. Chancellor Kent said, "A general diffusion of the Bible is the most effectual way to civilize and humanize mankind." Its circulation is an evangel of ideals; a knowledge of it founds in the minds of men those ideas that break down suspicion and substitute confidence, forbids one preying upon another and demands service one of another, establishes a universal spirit of democracy, and inspires humanity with brotherly love.

CHAPTER VI

The Social Way of Unity

1. THE FIELD AND THE KINGDOM.

It is estimated that there are now 1,700,000,000 souls in the world. Of this number only about 550,000,000 are even nominally Christian. Thus two-thirds of humanity are yet to be evangelized. If we count those vast Catholic and Greek populations that are yet superstitious and idolatrous adherents to a form of Christianity, such as those of South America and the masses of Russia, and add to them the worshipers in the ancient and degenerate churches, such as those of the Copts, the Armenians, and the Nestorians, the number will be increased by 150,000,000 more. If we estimate the number of Protestants at a round 200,000,000, there yet remains a like number of Roman and Greek Catholics, among whom the millions dwelling in exclusively Catholic lands have great need of a higher social plane of life, to say nothing of the needs of a correct religious conception of the exclusive place of Christ in our faith, of freedom of conscience, and a conception of the practical oneness of religion and righteousness.

If for the sake of our immediate problem we confine ourselves to those peoples who are non-Christian, we are almost appalled at the vastness of the under-

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taking. Here are 200,000,000 Mohammedans who have scarcely been touched. Their vigor as a missionary force has been overestimated, but they are practically the only missionary religion outside Christianity, and that they are pushing an active propaganda in the Soudan and south into Equatorial Africa. The Senussi of the Soudan have a definite organization for propaganda, and are imbued with all the fanatical intolerance of the old-time Moslem. In India Islam makes progress over the native faiths, largely because it destroys caste and appeals to the millions that are under its thralldom among the lower and out-castes, but India is a free country and Mohammedans are won to Christianity. Turkey is opening to the message and Moslems are among the inquirers. Freedom of the press and of speech can not long prevail without freedom of action following. The process may be slow, but "the mills of God grind slowly." Persia is awakening and Mohammedan children are found in her mission schools. In Africa the creeping frontier line could be successfully turned back by a strong line of mission stations from Uganda to the Congo. Islam is not insuperable, though she presents the greatest need for strategy in the statesmanship of the modern missionary church.

India's 300,000,000 present the greatest social need of any of the older lands. She is the oldest of the great missionary fields and there is within her borders to-day a Christian community, counting those who have openly accepted the Christ and those whose lives are more or less ordered after the tenets of Christianity, though not openly associated with any Chris-

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tian communion, of 5,000,000 souls. This is a small proportion, but when we compare it with historic parallels it is very encouraging, and if we could measure the leavening influence of the missionary force upon the social and national life of the people, we should be fairly astounded at its success. Sir Augustus Rivers Thompson called the missionaries the "true saviors of the empire," and Sir Andrew Fraser told a convention of commercial men that out of thirty years' experience as a government administrator in India, he was convinced that the missionary had done more for her uplift than all other agencies combined. But India's multitudes are yet under the thralldom of superstition and in bondage to caste. Famine devastates her and a million die in one section while plenty is enjoyed in another, yet there will be little charity. Millions live in squalor and die of plague and preventable diseases because they have no physician. She is a vast and rich land, and science and the spirit of humanity would make her equal to all her problems, but she is blinded by her superstitions and enslaved by her anti-social customs.

China's 350,000,000 are in the dawn of the most stupendous change history will have to record. The great lethargic giant is yawning after two millenniums of sleep, and what he will do when fully conscious of his powers will depend upon the manner in which we deal with him. He is naturally peaceable and a lover of industry. If we touch China with that "enchanter's wand" which Darwin found in missionary benevolence, it may be won to the Kingdom of God through those peaceable works whose fruit is righteousness. Sir

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Robert Hart warned the encroaching nations that they "thought China moved too slowly." "Some day," said he, "you will think she moves too fast." There the masses labor for from six to ten cents per day and devote hundreds of millions to votive offerings at the altars of their false gods. Corruption has reigned so long in all governmental circles that their efforts at material progress will entail vast burdens upon the toiling masses through the historic methods of "squeeze." They have not that sense of truthfulness without which a vast commercial life can never be builded. Indirection characterizes their intercourse, and lack of accuracy makes the forward way tortuous. "China," said President Angell, once American High Commissioner to Peking, "will never be redeemed until she bows the knee to Christ." It is not necessary to recount the story of her suffering millions, even in times of plenty. Poverty is omnipresent, and epidemic disease is reckoned up to spirit forces. Until she receives that Christianity which one of her scholars described as so wonderfully opening the "eye of the mind," she will not successfully be made anew.

Japan's crowded areas have scarcely been touched by the missionary evangel. Her millions are digging sustenance out of her mountain heights and searching for it in the sea. These masses have scarcely been touched by Christianity. The middle and upper classes have heard the message, and ten have been made better by it for every one who has openly identified himself with it in the churches. Prince Ito was one of the party Verbeck sent around the world that they might see what civilization had to offer. In the days

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of the Revolution he thought Japan needed our Western science and education and all the arts of our material and intellectual progress, but said that their religion was good enough for them. In his later life he commended Christianity for its ethical code, and said that had it not come to his country its young men would have been plunged into excesses of immorality. Count Okuma counsels the youth of Japan to practice the morals of Christianity, and says that without it the developing nation can not hope to endure, for Christian morality is the sure foundation of progress; the thousands that are taught in his school are instructed in Christian morals. Japan needs a morality that will redeem her youth from loose habits and elevate her women to a place beside her men. The 40,000,000 common people have scarcely been touched by the missionary evangel, and a revived Buddhism offers a new challenge among the more educated.

Africa is yet an unoccupied continent. Vast areas of her inner plateaus are unoccupied, and tens of millions have not yet heard that there is a Christ or a Christian civilization. Millions are yet held in slavery in her interiors and cannibalism is still practiced by many tribes. Woman is a chattel, home is unknown, war is the vocation of millions, suspicion paralyzes social life, and humanity lives on a plane little above that of the beasts about it. In the Soudan are unexplored states as vast as Texas, and lines of travel from 3,000 to 5,000 miles in length have no missionary station. The Dark Continent is scarce touched, though where she has been laid under the missionary conquest she has furnished veritable Pentecosts, and

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the story of the new way of life that has sprung up over the old unspeakable degradation has been like that of Alladin's lamp.

Space will not permit an account of Tibet, just opened to the Gospel after thirty years of waiting at the Moravian outpost in the Himalayas; of the Steppes of Central Asia, with their millions of nomads who live as the ancients did before the days of Abraham; of Siberia, with its frozen stretches of sparsely inhabited territory, and of the islands of the sea where the vileness of man reaches its lowest degree, but where the story of Fiji and the New Hebrides can be retold a hundred times if only the evangel be sent. Suffice it to say that if the marvelous success of missions in the past fifty years is a challenge to greater undertakings, the vastness of the field yet untouched and the need of extension in the lands already entered constitute a call that is tragical in its tone, but that is never discouraging in the light of missionary history, nor in the promises of the God of Nations. To do the work calls for more than the vision and the consecration of the churches; it calls for efficiency at the task as well, for no amount of enthusiasm will avail if it be not so directed as to bring the greatest results. The call for missionary efficiency is a call to unity. Where one puts a thousand to flight, two will chase their ten thousand. The church dare not present other than a united front to the need and to the opportunity.

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2. THE THINGS THAT UNITE, AND THE THINGS THAT DIVIDE.

Men rarely differ on their knees, nor in the presence of a recognized human need. Mercy is not denominationalized, nor has charity ever been the means of separating Christian peoples into sects. There is no record of a division in Christendom being brought about by the doing of good, unless, mayhap, it was by some who protested against doing it. The great unifying incentive is a recognition of the task to be undertaken. The great unifying spirit is an enthusiasm for humanity. Jesus prayed that his disciples should always be united, in order that the world might believe he was sent for its salvation. The force that unites is taking hold of the church in its rising recognition of the needs of the world and the coming of the faith that convinces it of Christianity's power to save all men, regardless of race, clime, color, station, or previous condition. The spirit that unites is taking hold of the church in the coming of that social conscience which Prof. Francis Peabody characterizes as the "greatest discovery of the age." It is the social call, the call of humanity that unites.

The major divisions within the church arose over questions of conscience. In the larger number of cases they came because the church, as constituted, forced the advocates of some new doctrine out of their fellowship with the intolerance that characterized the age. Many of the smaller cleavages have been effected by mere differences of opinion, or by some sectional or minor difficulty that took root in a time which em-

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phasized liberty of opinion to the detriment of efficiency in action. But to-day the great contentions for conscience sake have been won and have become the possession of all the churches. Sectarianism stands to-day as an arrested development. There are no great essentials that longer divide Protestant Christianity into denominations. It is the hold of tradition, the historic continuities, the prejudices of early training, and questions of form and polity, that keep up the walls of division.

The question of unity is not only one of more love and loyalty to Christ, but one of less fealty to the denomination as well. The plea that various denominations present various phases of truth to fit various types of mind falls down utterly before a candid search of fact. On the mission field the practice of "delimitation of territory" annuls such an apology. If Methodists take one field and Baptists another in the Philippines, is it because men have searched and found that one district presents a type of mind that the one denomination fits and the other does not? It is simply because there is a great need, and in its presence all thought of "types of mind" is lost and the two denominations agree together, that, in the interest of their great common cause, they will not divide communities and compete for souls, but will co-operate for their evangelization. And they each find that the other makes quite as good Christians as itself. Missions are saddled with our home divisions, but are trying to meet the issue on the lines of least resistance.

One of the dramatic moments of the Edinburgh Conferences was when a native Chinese delegate ad-

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dressed the gathering with a plea for union. He reminded the assembled delegates that whatever our traditional differences meant to us, they meant nothing to them. Bishop Root says we must lead the Chinese churches into union or forfeit our right to leadership. In Japan the mission churches tend to unity as rapidly as they become self-supporting. On no field would the denominational divisions long prevail if the churches were self-supporting, nor will they after self-support is possible. The forms of government and the creedal statements we have taken to them are barriers, but they will not be insuperable, for while we have been using them in our evangelization we have been so dominated by the unifying spirit of Christ in the real fundamental work we have been doing, that the spirit will conquer the letter, and union will win over form.

At the New York Ecumenical Conference in 1900 the missionaries pleaded for unity and the delegates from home for comity only. At the Edinburgh Conference in 1910 missionaries denounced sectarianism as a sin and all pleaded for union in the task. Union is coming by way of the mission field. At home we have a Christian civilization and are satisfied. On the mission field there is a pagan or a savage state of society, and the missionary is confronted by such appalling necessities that he is driven to unite all forces to effect their overthrow. The churches at home are less concerned about co-operation in just the measure that they are less concerned about Christianizing the whole earth. To the missionary, confronted by the appalling evils of heathenism, opinions, traditions, forms of worship, and methods of church government

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count for little, and the victory over heathenism counts for everything. Their infant churches are surrounded by heathen practice and need all the help unity can give. Here at home we are afflicted with a social inertia that makes movements away from the old moorings difficult. Out on the frontier the worker thinks less of what means he shall use than that he shall use the most effective means that can be devised. They hold fast to eternal principles, but they are much more ready to adopt working expedients and become all things to all men, if by any means they may win some. They are doing what Dr. J. P. Jones, for twenty-five years a Congregational missionary in India, pleads that we all do, *i. e.*, "Place more emphasis on the Kingdom of God." We will then, he adds, "Cease to attach so much importance to forms of church organization," and he might have added, as indeed he does in other words and in many ways, to opinions and traditional attachments, and to all else that keeps us apart.

It is emphasis on the Kingdom of God that is most needed. On the mission field the conception that Christianity is to be planted in the life and custom of the people is well grounded. Once men went with the idea of merely rescuing whom they could from the lost masses of heathenism. They believed every pagan faith to be at enmity with God, and entertained little hope of rescuing whole civilizations and races to a Christian manner of living. To-day the typical missionary finds much in the native religions that are voices in the wilderness, pointing to a better way, and he seeks to show how Christianity fulfills their inadequate leadings.

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He discovers hidden lodes of human wealth under the debris of heathenism and seeks to bring it to light by his Christian appeal. He pursues the gospel method of winning men one by one, but looks upon each one as new leaven in the lump of native life about him, and lives in the faith that it will take only a considerable minority of such transformed lives to begin to lift up the whole mass. When the leaven begins to work he has a vast force to aid him in the amending social ideals of the unconverted multitudes. Every art that adds to the comfort of life, every moral compulsion that brings a little more of the saving salt of righteousness, every ideal that adds a new star in the pall of darkness and lightens the pathway to unguided feet, every constraint of mercy that softens the heart of heathen hardness, every newly awakened human sympathy, every newly welded bond of patriotism, every abandoned cruelty in ancient custom, and all else that adds to the joy of living, increases fraternity, cultivates sympathy and confidence in human kind, and makes life better worth living, he counts as a part of that "more abundant life" Jesus came to give to men, and as a contribution to the coming of that Kingdom of God he came to establish in the earth.

Missionaries find no difficulty in co-operating in those things that all the world recognizes as matters of Christian charity and righteousness. In those things does the Kingdom of God consist and for them the church was founded. It is only in the measure that Christendom has become concerned over the means whereby the world shall be saved, more than it has over the saving of the world, that it has neglected

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“righteousness, peace, and joy in the Holy Spirit,” while tithing the mint, anise, and cummin of ologies and polities. Less zeal for an ism and more for the weal of men will unite the church in the course of time. There is no denominationalism in easing pain or curing bodies; why should there be in “binding up the broken-hearted,” or in the “cure of souls?” The missions co-operate in medical schools and in education. They operate mission presses in co-operation. They present a united front in appeals to governments, and in protests against their detractors. The Mission to Lepers finds no difficulty in operating through all missions. The Christian Literature Societies of China and India and the Religious Tract Society find all doors open to their contributions to the common cause. Union is easy in doing famine or flood or epidemic relief work. United effort has been exerted against such crying social evils as slavery, foot-binding, infanticide, the treatment of woman, the opium traffic, caste, the liquor trade, the Congo atrocities, and every other form of evil that afflicts or threatens humanity. To build two medical schools where one would give more proficient training, or to put hospitals into competition, would not be thought of on the mission field to-day. Books are translated by union committees and used by all. The missions in Japan, West China, and South India issue year books that treat the field as a unity and emphasize the co-operation existing. The *Chinese Recorder and Missionary Journal*, the *West China Missionary News*, and the *United Church Herald of South India* are union journals, and many others

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co-operate in publication. All contiguous missions meet for prayer and conference.

There is no division in regard to the great fundamentals of doctrine. All missionary communions hold to the Fatherhood of God, the Lordship of Christ, the sufficiency of the Scriptures as a rule of faith and practice, and to the church as representing the living body of the Savior. Each believes that the others are Christian and that they are helping to bring the Kingdom of God into the earth—why should they not labor together to bring it more quickly?

3. BREAKING DOWN THE WALLS OF DIVISION.

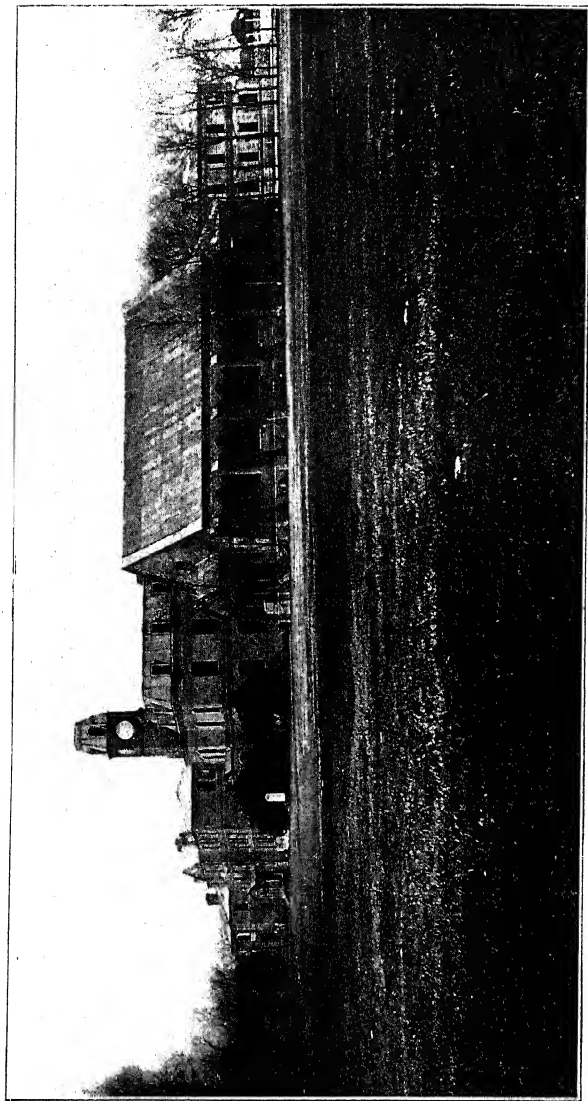
The divisions of Protestantism are not ancient, nor are they final. No one denomination expects to absorb all others and become the final church. All recognize that the needs of the world are not met by the things that divide, but by the things that unite. But union will not be the thing of a day, nor will it ever be effected by resolution. Neither will it come through ecclesiastical agreement, but it will come through the gradual drawing together of the churches by the inspiration of an overpowering common objective, and by actual co-operation in the common tasks.

The overwhelming present need is the drawing together of the workers in the common task. It is through unity and co-operation that union will come. The tendencies are shown in great inter-missionary conferences like the Decennial Conference in India, the fourth of which is about to be held; the South

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African Conference, three of which have already been held; the Shanghai Conference, which was the first of a series that will become a regular feature of the work in China; the regular Japanese meetings for all missions, and the great Pan-Islamic Conference; all these are cultivating the way to larger co-operation. Sectional conferences are held in almost every field where there are contiguous stations. City associations are uniformly organized in all the mission centers. Departmental meetings to consider various phases of the work cross denominational lines; they are held to consider such problems as education, medical work, literary output, work for women, and industrial training. Such conferences make the workers acquainted and emphasize to their minds the advantages in co-operation and the power in common effort.

In India, West China, and South Africa, Boards of Arbitration have been established. They decide all matters of difference and help to formulate concrete ways and means for co-operation. In the first of these thirty missions are united, every mission board but two accepting the co-operation. In the second every mission and board operating in the territory have joined, and in the last all but one. In the Philippines all but the Episcopalians have entered the "Iglesia Evangelica," or Evangelical Church, and the field is divided so as to prevent overlapping. In Japan all but the high church Anglicans and the American Episcopalians are in the union for promotion of "The Christian Movement in Japan." In Korea the Methodist and Presbyterian bodies have divided the field, and in making the readjustment transferred



Sectional View of Nankin University. This is a union institution, supported by Disciples of Christ, Methodist Episcopal, and Presbyterian Boards.

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churches and members from one communion to the other, and that without friction. Indeed, it seemed to add vigor to their common cause. In West China free interchange of members is practiced. India is working to the same end and many missions practice it independently. The mission church can not deny fellowship to one who bears the name of Christ and who is almost sure to be lost amid the overpowering influences of the old heathen life if he is out of fellowship with his brethren; fellowship is given even if full membership is not.

In facing Western civilization China recognizes that the school offers the royal road to progress, and she is founding a national school system. The missionaries are confronted with the task of injecting Christian morals into the new learning of the empire. They find it necessary and easy to rise above denominational lines in giving instruction. Equipment and an able teaching force can not be provided otherwise. Efficiency counts for everything in creating the new education for that empire, for they have long had scholarship and have keen minds for learning. The Nankin University is a union of Methodist, Disciple, and Presbyterian schools. In West China the new university at Chengtu is being founded by the co-operation of all the great missionary societies working there, and the charter provides that all newcomers may have a part in its management upon entering the field. In North China the British Congregationalists and the Presbyterians have a joint Education Association that manages four colleges, supported by these two bodies. In Korea the colleges are union

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institutions. In India Madras College, one of the famous old Christian schools, has followed the example of the older denominational institutions in the United States by becoming independent and interdenominational. The famous Doshisha in Japan is practically the same. In Shangtung, China, English Baptists, American Presbyterians, and Anglicans co-operate in the management of three colleges, and will unite them into a university after the English plan. All over China the movement for the standardization of all mission schools is progressing, and secretaries to superintend it will be supported jointly. The tendency is strong there for union colleges with Biblical seminaries grouped about them. Yale College at Hankow, Christian College at Canton, and the university projected by Oxford and Cambridge at Hankow, are examples of the effort being made for the education of China by Christian influences that are broader than denominational interests. There are union theological schools at Tokio, Bangalore, Nanking, and Amoy. In Manila a union university is being projected. In Central China a movement is on looking toward the founding of a great union training school for evangelists and native teachers. The leaders of the future church in the mission field will not defend sectarian differences after being educated in the same schools and by the united effort of several denominational boards. In the field of medical training there is little division of effort. In Peking five great societies support one superb school. A like project is under way at Chengtu, in connection with the new union university there, and Nanking University is

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seeking to found another. Hospitals are supported by denominational societies, but they know no denominational lines in their work; at Iloilo Presbyterians and Baptists have united in the support of one. All medical associations are union, as are all educational associations. There is no division in the doing of good. Union evangelistic efforts are found feasible, and every co-operative effort brings to light new and mightier means for evangelizing the world.

It is very natural for union sentiment to bring about the amalgamation of subdivisions in the larger denominational bodies. This is taking place to a remarkable degree on the mission fields. The best known instance is that of the Presbyterian and Reformed bodies in Japan. Six different synodical bodies have united there and taken the name, "Church of Christ in Japan." The eight Presbyterian bodies in China have divided the empire into six districts, or synods, and are moving toward a national Presbyterian church. It is to be hoped they will adopt the same unifying name they are using in Japan. In India seven churches with the Presbyterial, or representative, form of government have united into The Presbyterian Church in India, while the four working in Korea have formed an independent Presbyterian Church for that Kingdom. The synodical form of government seems to make union easy, because of its representative character. The Episcopal form lends itself less easily to such amalgamation, as each bishopric has a fealty to preserve. In Japan they have a working union that promises a national church with Episcopal government. The Methodists have already united

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there and have a native bishop. As is usual, the native churches found means for union easy; the churches that were supporting them from the home field found assent more difficult. The various Lutheran bodies in all Asiatic fields are moving toward union. In India the various Baptists bodies are uniting. In Madagascar the Congregationalists and other independents found no difficulty in getting together, and likewise in Amoy, China. The more democratic churches of Congregational government have done less in a formal way, but practice a degree of unity that no other missions do, just because there are fewer formalities in the way. Their conferences answer informally where more highly governed ecclesiastical bodies must have formal agreements.

But the union of denominational families is not final. It is a step forward, but the main lines of division are still preserved. Geographical union, or the union of all bodies within a certain territory, is union indeed. This crosses all lines of division and considers only the common good. The Shanghai Conference resulted in the "Christian Federation of China," whose purpose is "to encourage the sentiment and practice of union," and "to hasten the establishment of the Kingdom of God in China." They appointed a committee to stimulate every kind of co-operation and union effort. In Japan the older Evangelical Alliance is undertaking the same kind of effort. At Nairobi, in East Africa, eight missions, representing bodies as far apart as Baptists and Episcopalians, have formed a like working alliance. In West China, one of the virgin fields and a leader in all such forward

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movements, an Advisory Council has been effective for ten years, and has now issued a declaration favoring "one Protestant Christian Church for West China." They practice free interchange of members just as the churches of one communion do, and all are happy in the fraternal concord of it. In India, after nearly every mission body had passed resolutions favoring it, the great Interdenominational Conference, held at Jubbulpore in 1909, organized "The Federation of Christian Churches in India." They welcome to membership "all churches and societies that believe in God through Jesus Christ, and that accept the word of God as contained in the Old and New Testaments as the supreme rule of faith and practice." They appointed provincial councils and committees on unity, and directed them to secure actual union wherever possible. They are endeavoring to find a basis for the interchange of members, and are cultivating a sense of oneness in the native mind, preparatory to that actual union which they pray may come. The problems of baptism and the form of church government present the most formidable obstacles.

The most significant of all union movements, however, has been brought to successful conclusion in South India, the oldest of all mission fields, and the scene of the greatest missionary successes offered in lands where there is a native culture. It is the most significant because it is the first complete unification of different denominational bodies yet effected on a large scale, and because it gives promise of what other mission fields may do as they grow older and more mature in their native conceptions of Christianity.

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Previous to 1907 the various Congregational bodies in South India united into one organic communion. In that year they invited the Presbyterian bodies to affiliate with them. The overture was accepted, and release was asked from the synod of the Presbyterian Church of India. This was granted, and a union church of 140,000 members was organized under the name of the South India United Church. Negotiations are now being carried on with the German Reformed and Lutheran bodies working in that section, and there are signs of promise that not only they, but, in course of time, all bodies of Christians in South India will come into the union, and there will be one simple Christian Church that will rank in members with many of the Christian communions at home.

The Edinburgh Commission on Co-operation and Union found many difficulties in the way of actual organic union, but declared that somewhere beneath them all must be found the deeper unities and the true spirit of Christ, in which alone we can answer his prayer for union.

4. THE DAY OF OPPORTUNITY.

That eminent missionary statesman, John R. Mott, in his recent book entitled, "The Decisive Hour of Christian Missions," says that in the face of the opportunities of to-day, overlapping, waste, and friction on the mission field are sinful. He contends that the question of union is not primarily doctrinal, but moral. God holds the church responsible for the conquest of the world, and if she allows the victory

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to wait and men to be lost while she bickers over traditions and opinions and politics, she is morally guilty of a recreancy to opportunity. Mr. Mott says, "The hope of real success in taking the gospel to all the non-Christian world in our day is in a campaign characterized by the spirit of unity." If the church were one, as the Master prayed, the world would soon be led to believe. Instead of millions wasted in duplicating plants for church work at home, it could be sent where the need was greatest. Villages with five churches could be well provided with edifices, be ministered unto by a much better type of preaching, pay more adequate salaries, and send as much as they keep for home work to the more needy tasks of the foreign field. Great city congregations that build magnificent edifices on opposite corners and spend tens of thousands on competing orators and choirs could make every slum and foreign quarter of the city a missionary parish, and then send tens of thousands to those who never heard the gospel they hold in common but follow in division. Money spent on denominational establishments for the sake of specific sectarian propaganda would reach a multitude with a healing hand where it opens wounds of discord in the body of Christ here at home. The missionary is less concerned about the things that divide. Christ is all in all to him because the need is so great and Christ alone is sufficient. Hudson Taylor said the China Inland Mission "regarded it of secondary importance by whom the sheaves were garnered." "Our divisions inflict serious wounds on the body of Christ," said a missionary at the Edinburgh Conference. But union will never

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come by conference or by platform; it will come by the overpowering force of a great objective. When the church sees the world as its Master saw it, they will unite for the specific purpose of saving it to his manner of life.

Opportunity calls for a conservation of forces. Never before were such openings offered. All the world is now practically explored, and with the opening of Tibet and Afghanistan the last of the closed lands are opened. There are regions in the Soudan where fanaticism would protest and doubtless make its martyrs, but that it can be entered is already proven. Vast areas of Central Asia are yet not pre-empted, but the work in Manchuria could be duplicated in many places there. The great Moslem world is yielding to a more tolerant attitude, and in Russia, Persia, and Turkey, Mohammedans are willing to listen to the Christian message. "Religion has been the cause of race hatreds and individual hatreds, but now we are learning that religion may be, and is the greatest band to bind us together into a great fellowship in the Fatherhood of a common God," said one of the leaders of New Turkey. Christianity should take the bond of unity to a man like that. Korea is reaping the greatest returns of any field open to-day, but there are millions not won in Korea, and nothing could so discourage the native church as a spirit of divisiveness or the competition of denominational enterprise for their fealty. Siam is as open as Korea, and Madagascar is again under the rule of a favorable governor. All Africa is ready for a Pentecost if only a generation of time be given and an army of efficient men and wo-

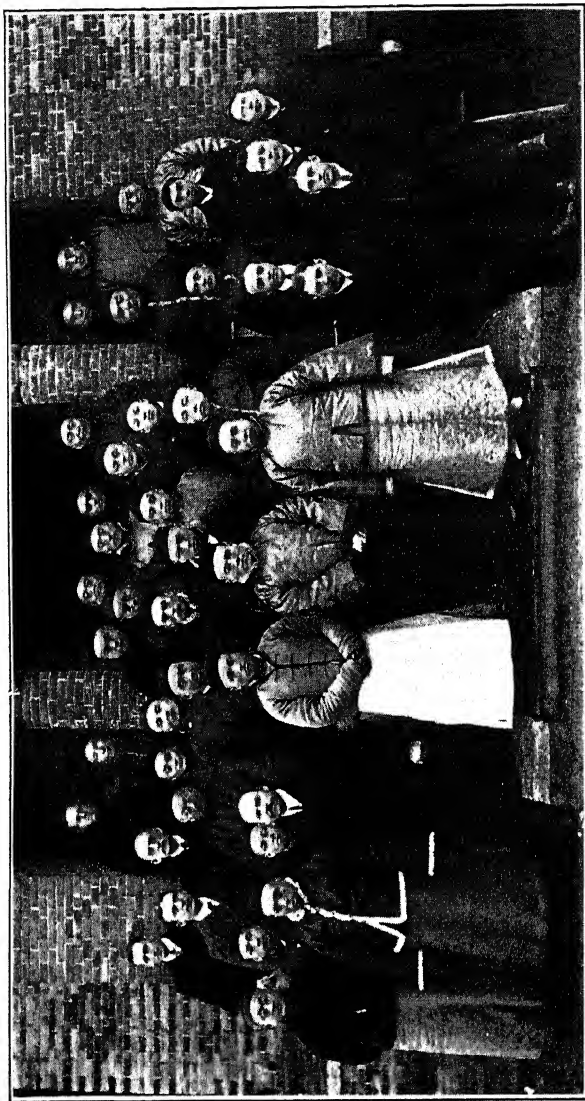
THE SOCIAL WAY OF UNITY

men be sent. China is so accessible that a prominent missionary there says no land is more open; it is certainly more tolerant and open to a free message to-day than Russia. Japan has passed through her era of reaction and opposition and is yielding as never before; the church made a gain of 70% there in the last decade. The ferment in India will issue in a new interest in the larger things of the world, and Christianity will reap a great harvest; already there is an unsurpassed opportunity to garner among the 50,000,000 low and out-castes and to compete with Islam for their fealty. Among the aboriginal tribes of West China there have been great ingatherings, but to introduce a divided church among them would be to hinder them and lose many. There is no way to answer this call of the cross adequately except by a united effort. John Mott believes that a union of forces to-day would double the effectiveness of the host upon the field; it would certainly more than double the power of the church at home to occupy the territory open.

The peoples of the earth are to-day awakened by the new internationalism. The victory of Japan over Russia, the peaceful revolution of China and Turkey, the vast spread of commerce, the awakening that the missionary has taken into every quarter of the globe, the quickened means of transportation, the railways into the heart of Africa and China and across Arabia, the recognition of the Orient in international conferences, the unrest of India, the opening of the great Soudan by England and France, the drawing of the nations together in The Hague Tribunal, the universal dissemination of cheap literature, the new peace and

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the promised prosperity of South America, and the universal progress of democracy in all the nations have opened the minds of men as they have never been opened before. Old prejudices and provincialism are on the wane and a larger view of the world is becoming universal. The spirit of national independence is growing among subject peoples, learning is becoming universalized, and science is spreading its evangelism of fact where superstition has reigned; all too often learning has taken with it a spurious and short-visioned skepticism, and commerce a materialism that will be difficult to uproot, once it is well attached to a people. Wars may arise in the friction that comes with a new found independence, racial hatreds will grow as subject races cultivate patriotism and a sense of independence, the customary haughtiness of a "superior" race will be resented by the rising of "inferior" peoples, and unless there is a gospel of peace to spread an effective evangel, trouble will be an inevitable accompaniment of the new age. If the nations and peoples are allowed to open minds to the larger world and to judge it by its past treatment of them, and by the spirit of the trader and politician alone, there can be only resentment in their hearts; but if there can be sown in their hearts the message of humanity, the truth of Christianity as distinct from the acts of so-called Christian men and nations, the confidence it gives every man in the better nature of himself and of his fellow-man, and the inspiring facts that history has to tell the unbiased mind of its contributions to the evolution of civilization, the new world that is to come may be born without the birthpangs of medievalism, and the evangel of



Faculty of Nankin University. This illustrates not only how different communions can co-operate in missionary work, but how different races labor side by side in it.

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peace will become the harbinger of a true internationalism founded upon brotherly love.

The native church on the mission field desires union. It will be a sad blow to its future effectiveness if we insist on drilling it in our traditions and setting its plastic life firmly into our Western moulds. Mr. Chang Ching-Yi, one of the leaders of the native Chinese church, said at the Edinburgh Conference: "Speaking plainly, we hope to see in the near future a united Christian church without any denominational distinctions. It is not your particular denomination that you are working for, but for the establishment of the Church of Christ in China." "I can conceive of no figure of speech that will justify division of the church," said J. Campbell Gibson, of China, one of the greatest of living missionaries; "the church is the body of Christ in Scriptural figure, and to divide it is to rend it and to give it pain and to destroy its usefulness." The great tasks of evangelism and the planting of both Christian character and Christian philanthropy in the mission field is to be largely the work of the native church. What could be more disastrous than to divide the forces and set them in competition; what more wasteful than to leave them a spirit of contention, and what less of the spirit of Christ than to turn their minds against one another when millions await their united efforts. The call of the time is that the evangel shall be effective, that the day be hastened, and that the native church be panoplied with the instruments of a holy warfare, and not burdened down with the useless weapons of tradition, Western opinion, or any sort of divisiveness.

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If it was the desire of the Savior's heart that the nations should be at peace, we shall best lead them if we are united; if it was his desire that they should have his gospel and his prayer that his disciples be one that the world might believe, we shall best serve him by at least refraining from carrying our divisions to the mission field; if it be our own desire that the church be in that unity that will make it effective in the world and pleasing to its great head, we shall best realize our desire by enlisting the churches in the overwhelming task of bringing the world into his Kingdom. It will cost the sacrifice that every great quest costs, but no truth will be sacrificed, only our half-truths. It will be realized only as we forget self in the mighty crusade.

5. THE CALL OF THE CROSS.

What we call the Lord's Prayer was really the disciple's prayer. The real Lord's Prayer is that final petition which comes to us like a call from the cross. It was that we might all be one that the world might believe that he was sent. It was not a prayer for mere unity and co-operation. It was that we might be one, even as he and the Father were one. It was for a real and organic unity. It was that the union which characterized his disciples at that moment might always prevail. A divided church will never conquer a world. In the early days of the Reformation the leaders openly preached that missions were God's business, not ours. They were interested in speculative theologies, and thought more of correct definitions than of evangelizing a world. They thought the doc-

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trine must be formulated properly or there could be no salvation. Luther denounced Zwingli in terms which burned with terror because the Swiss reformer differed from him in regard to the Lord's Supper. They had not learned with Christ that to do the will of God was the divine way of learning the true doctrine. Religion was more concerned with political affairs than with world-wide missions, and it was freely taught that the only missionary obligation was that resting upon governments in their colonial administrations. Good theologians frankly denounced the heathen as unworthy of salvation and called some who tried to take the gospel to them insane fanatics. As a result there was no missionary work of importance during the first two centuries after the beginning of the Reformation, but there were a number of divisions brought into the church, and the spirit that each sect maintained toward the other was anything but that of their divine Lord in his prayer for their union. That we are not yet purged of that ecclesiastical spirit all must acknowledge. We shall be under the incubus of it for some time no doubt, for there will be narrow-minded partisans, and even leaders who will be more devoted to their sect than to the Kingdom of God, until the spirit of fraternity so sweeps over the church that it carries them off their feet and hastens them along with a providential tide.

That day is fast approaching when the spirit of brotherhood will so seize upon the Church of Christ that there will be few apologists left for sectarianism and partisanship. The whole tide in the affairs of men is toward greater unity. Nations are merging from

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separated states into more closely annealed unities, as witness in our own country, Germany, China, India, Australia, and South Africa. The whole world is drawing together. The cable and telegraph, the swift locomotive and express steamship, wireless and the aeroplane, are abolishing distances and making all the world acquainted. Intelligence of one another brings understanding and abolishes prejudices. Trade and travel are welding us together with the metallic bonds of common interest. War was once pleaded for as a maker of trade and a creator of virile manhood. To-day commercial bodies are foremost in denouncing it as a destroyer of trade, and sociologists as the greatest devastator of the strength of nations. But a little while ago, as history records time, nations preyed upon one another, and all the world believed that to the strong belonged the battle. To-day no nation enters an imperialistic campaign without attempting to convince all the world that it is in the interests of the weaker peoples and for the good of the conquered. The interests of humanity are becoming one, and men are recognizing that co-operation between nations and peoples redound to mutual benefit, and that strife is both expensive and uncivilized.

What is happening between the nations is taking place within the nations. Co-operation is the watchword of both industry and commerce. Cut-throat competition is expensive and must die the death of all survivals of our barbaric life. Men have found that they can make more for themselves by agreeing together than by trying to get the advantage of one another. Labor is discovering that in unity lies its

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only hope of a better wage and a higher standard of living. Co-operation is the watchword of the age, and it registers a new era in human progress.

This spirit of the age is nowhere more manifest than in the church. Every city has its evangelical alliance, or some organization that corresponds to it. Several States have church federations, and the Federal Council of Churches is equaled only by the English Free Church Council in the magnitude of its meaning as a unifier of Christian activities. There are few apologists for sectarianism left, and pulpits ring eloquently with union appeals in the name of the common faith we profess and the common task we have to do. In Canada, South Africa, and Australia genuine church union movements are in progress. In South Africa a temporary halt has been called, but in Canada the churches concerned are voting two to one for the merger, and the same majority obtains in Australia. In the United States the various Northern Baptist bodies are uniting, as are also the Presbyterians, and all denominations are conducting negotiations across the mythical Mason's and Dixon's line in an effort to overcome the unfortunate breaks brought on by the Civil War. The same process of first drawing together the denominational families into the larger denominational unity is operating at home as on the mission field. Where they lead we are sure to follow. We have the great incubus of tradition, lesser zeal, and the vested interests of denominational societies to deter us, but awakening missionary interest will imbue us with the same spirit that has been moving the real missionaries.

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The most promising sign of the times, however, is the universal awakening of the church to its social duty. It has moved out of the down-town as the slum moved in, and the efforts of the social settlements to do what it would not undertake is rebuking it for social negligence. It has seen every form of social amelioration undertaken by organizations of Christians, organized under other names but seldom under her auspices, and she is asking why she has been unable to meet the need herself. The answer is her divisions. She has been taxed to support duplicating church organizations and had nothing left, either of money or men, to devote to the greater task of social effort. She has unsparingly denounced Roman Catholic ecclesiastical and doctrinal errors, but been compelled to see a united Catholic church rebuke her with a charity that is unexampled, and she realizes that it is not Catholic doctrine but Catholic unity that has made it possible, while it is not Protestant doctrine but Protestant divisiveness that has prevented her from doing it. The late Amory Bradford said that he found in one town in Japan four little Methodist missions, each of which had to be visited by a different bishop from home, representing the sub-denominational divisions we maintained, and the expense was paid by contributions taken in pleas for the heathen. The mission churches saw the irony of such a condition, and those four missions are to-day one, with their own native bishop to superintend their work. When the churches at home awaken to an economic sense of the waste involved in denomina-

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tional duplication, they will stop it on the home mission field as they are already stopping it on the foreign field. "Denominationalism, as a principle, is doomed to death," says Canon Hensley Henson, a noted Anglican clergyman. It will not be undone in a day, for as Robert Speer says, "From the beginning the greatest evils have succeeded in rooting themselves in the consciences of men," nor will it be done by ecclesiastical procedure, but by the overwhelming power of a great objective, such as the conversion of the world and the bringing in of the Kingdom of God.

Missionaries are tremendously impressed with the social needs of the world. They make their homes social settlements, and adopt institutional methods in their churches. They wrestle with the larger social problems in their active ministries and grapple with the social evils of heathenism with firm and steady hands. "The message for China," says Frank Garrett, of Nanking, Secretary of the Evangelistic Council for China, "is the message of the prophets, justice and righteousness and God's protecting care. The message of Amos rings out as though it were written for China to-day. What China needs to-day is men of the type of the old prophets of Israel. The leading men in the Chinese ministry to-day preach a social and national message." Just because this larger conception of the work of the Kingdom of God has seized hold upon them, they have less interest in perpetuating divisions. Fraternity is the great social message that Christians must bear to the mission fields, and they can not do it well with a divided church. They can

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not preach the full gospel while their hearers are asking why they are divided, if there is but one Christ and one way of salvation. So the missionaries in Japan have declared that "all who are one in Christ by faith are one body," and those in China have united in the declaration that "in planting the Church of Christ on Chinese soil, we desire only to plant one church under the sole control of the Lord Jesus Christ." In Korea and the Philippines the missions, with one exception, all wear one name and banish the denominational title to a parenthesis that can be easily erased.

The call of the Cross is a call to united service in the interests of all humanity and of all that benefits humanity. Christ said more about this world than any other founder of a great religion. He did not neglect the other, nor can we long keep a message for this present age if we have not one for the future, but his emphasis was upon the need of righteousness. Men were to believe unto righteousness; they were to seek God and his righteousness; his Kingdom was one of righteousness, and he died that men might become righteous. To do justly, love mercy, and walk humbly with God is the world's great social need. Religion only can constrain it to such ends, and Christianity offers the divine prescription through its Lord. When the Christian world is more concerned about living Christ than it is about defining him, it will come to understand him, but never until then. The missionary faces the mighty forces of heathenism and is enlisted in service against them. He sees the need of a solid front and is leading Christendom into that union, both with its Lord and with one another, for which

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he prayed as he went to the cross to lay down his life for the world.

And what dost thou answer Him, O my soul?
Is it nothing to thee as the ages roll,
That the Lord of Life should suffer in vain,
That He who was Prince in the Realm of Pain,
Should seek for the sin-stricken children of men,
That by way of the cross He might bring them again
To the fold of His care—His infinite care,
That thou shouldst turn from this, His prayer,
And deaden thine ear to His wondrous plea,
The call of the Christ to me?

—*By Claude Kelly, in Missions.*

APPENDIX

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CLASS QUESTIONS.

INTRODUCTION.

SECTION 1.

By what means would Jesus save the world?

In what does personality consist? What relation does it bear to the work of missions?

What is the Kingdom of God? What do we mean by "saving the world?"

Discriminate between a theological and sociological Christianity.

In what way does the work of missions influence the social life of a people?

Discuss missions as a factor in creating a civilization.

SECTION 2.

How does the missionary overthrow false and cruel custom? Contrast the average of social life in paganism and Christianity.

Must a people adopt western customs to become Christians?

Can a people be transformed and made independent by the external gifts of civilization alone? Why is the "creation of new desires" fundamental?

Contrast a heathen with a Christian village.

Enumerate some of the social tasks of missions.

Discuss the relation of missionary work to social progress.

SECTION 3.

Which religions have been missionary and which not?

Wherein do Confucianism and Buddhism lack social force?

What in Mohammedanism makes it anti-social?

Compare the missionary motive and success of Christianity to those of other great religions.

What has been the secret of Christianity's success as a missionary religion?

What is the effect of missionary work on the moral standards of (1) individuals? (2) society?

Discuss Christianity in comparison with other religions as a universal faith.

APPENDIX

CHAPTER I.

SECTION 1.

What is the final test of a culture or a religion?

Which religion has done most to forward progress? Name some of the fundamentals it contributes to social progress.

Why is paganism pessimistic and Christianity optimistic? Relate wherein each of the great non-Christian religions have fallen short as forces for social progress.

How do pre-Christian civilizations compare to Christian civilizations?

How account for the difference?

Discuss the secret of social progress in Christian civilizations.

SECTION 2.

Why should missionary statistics be interesting?

Is Christianity the original faith of any people? What in its history justifies the belief that it will become the religion of all peoples?

Relate the progress of missionary work in each of the great missionary fields. Give the figures that show the total progress of the missionary conquest.

Enumerate some of the accomplishments of missions that figures can not tell.

How does the generosity of mission churches compare with that of the churches at home? What progress is missionary interest making at home?

Discuss the interest of the church in its world-wide task.

SECTION 3.

What makes Christianity the most virile factor in social progress?

What is the difference between a negative and a positive statement of the Golden Rule?

Wherein do the great non-Christian religions fail as leavens for social progress?

How does the personality of Christ contribute to the social power of Christianity?

What is meant by "the sacrifice of service?" How does the missionary illustrate it?

Discuss the nature of Christianity as a social leaven.

SECTION 4.

What was the social status of our Teutonic ancestors before the missionary went to them?

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What can you say of democracy in Greece? Of the status of woman? Of children? Of slaves in Rome?

What fundamental power in Christianity has always preserved it?

In what social state did the missionary find the various peoples of Europe? How long did it take to transform them? How does the progress of missionary work in China and Japan compare to that made in Britain, Germany, and other historical lands?

Discuss the comparative progress of modern missions.

SECTION 5.

What evangelistic power is found in ideas?

What idea is incarnate in the missionary?

What particular phase of missionary work is winning the approval of publicists and statesmen? Why?

In what does the missionary find progress? What relation does spiritual transformation bear to material progress in his work?

How does the conversion of individuals to Christianity react upon society?

Discuss the force of ideas as compared with the force of arms as a factor in the civilizing process.

CHAPTER II.

SECTION 1.

What relation must exist between husband and wife to make a true home?

What place does the Koran give woman?

What part does the family meal play in a Christian and in a pagan home?

•How does the position of woman in heathenism compare to that given her in Christian lands?

What mars the patriarchal household as a home?

What can you say of divorce in non-Christian lands?

What emphasis does the missionary put upon the home?

Discuss the Christian home in comparison with the heathen.

SECTION 2.

What position was accorded woman in Greece and Rome? Among the Teutons?

What place did early Christianity give her? Under what emperors was she first given greater legal rights?

Enumerate the gifts of Christianity to her.

Discuss the relation of "woman's rights" to progress in history.

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SECTION 3.

- State the position of woman in non-Christian lands to-day as compared with her position in pre-Christian Europe.
- Describe the lot of Hindu widows. What position do the Chinese give woman? The Moslems? What is her status in savage society? To what extent is education given girls in pagan lands to-day?
- Why are women slowest to accept Christianity?
- Why have the Parsis failed to give India their ideals for women?

Discuss the comparative status of womankind in Christian and non-Christian lands to-day.

SECTION 4.

- How does the pagan and Christian ideal for child life compare?
- What was "exposure" of children in Rome?
- What legal rights do non-Christian governments usually accord children?
- How widespread was the pagan practice of infanticide?
- What guarantee of right does Christianity alone accord children?

Discuss the influence of the missionary upon child life.

SECTION 5.

- What is the social settlement idea?
- How does the missionary home become a settlement? How many missionary homes are there? Tell some of the concrete ways in which the missionary home conveys Christianity to its neighbors.
- Describe some examples of heathen homes and villages. Contrast with them those of native Christians.
- What are the main influences of the missionary home?

Discuss the missionary home as a social settlement.

CHAPTER III.

SECTION 1.

- What part does benevolence play in social progress?
- What can you say for the benevolences of paganism?
- What is the average economic condition in non-Christian lands? What result does drouth or flood bring?
- Enumerate some of the inhuman practices of heathenism. What change does the missionary bring?

Discuss "the struggle for others" as a factor in human progress.

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SECTION 2.

What relation does healing hold to missionary work? What use did Jesus make of it?

What effect does physical depression have on moral life?

Why does the medical missionary so easily get a hearing?

Why did Buddhism lose its primitive charity?

Enumerate the larger influences of the medical missionary.

Discuss the value of medical missions to missionary work.

SECTION 3.

What is the state of scientific knowledge in China? India? Japan? Africa?

Enumerate some of the medical practices of non-scientific lands.

How do the death rates compare in Christian and non-Christian lands?

What is the fruitful source of disease in non-Christian lands?

What treatment is accorded the insane and lepers in non-Christian lands?

Discuss the value of scientific knowledge to missionary work.

SECTION 4.

How adequately are the medical needs of missionary lands met?

Describe the extent of medical practice under missionary auspices.

What use does the medical missionary make of preventive measures? Give instances of phenomenal clinics.

What does he do in the way of founding a native medical profession? Enumerate instances. When will his work be done?

Discuss the influence of the medical missionary upon social progress.

SECTION 5.

Relate instances where medical missions have opened doors.

Why is the physician more able to do this than others?

Tell how he enlists native benevolence. Give instances.

Describe the pervasiveness of medical work; the way in which it cultivates native sympathy.

What peculiar work can the woman physician do?

Give ex-Secretary Foster's estimate of the value of medical missions.

Discuss the evangelistic value of missionary benevolence.

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CHAPTER IV.

SECTION 1.

What use does the missionary make of education? Give statistics of missionary schools.

Enumerate some missionary contributions to the literature of non-Christian lands.

How extensively does he supply schools? What does he teach in them? Why should he give a general education?

What is the educational status in non-Christian lands?

Relate the progress of education in Japan and China.

What is the fundamental thing in education? How does the mission school supply it in comparison with the governmental school of a non-Christian land? What is the difference between a governmental school in a non-Christian land and a public school in a Christian land in the teaching of morals?

Discuss the place of Christian education in civilization.

SECTION 2.

What dangers do mere material gifts take to inferior civilizations?

How does Christian education supply the fundamental elements in a civilizing process?

Cite instances of missionary education furnishing native leadership.

What is the extent of the influence of educated Christian men in Japan? in China? What handicap are they under in China? Why?

What influence does Christianity have on the making of a democracy?

What was Gladstone's test of a religion's efficiency?

Discuss the place of native leadership in the progress of a people.

SECTION 3.

Is the primitive mind practical? What of its scientific habits? Why does the Malaysian refuse to earn wages?

What fundamental does industrial training supply the primitive mind in the creation of social progress?

What is the ideal of industrial training in mission schools? Relate instances where industrial training has created industrial communities.

What fundamental economic factor does civilization supply?

How does industrial training make it effective?

How does industrial education react upon the direct purpose of the missionary in his evangelistic work?

Discuss the place of industrial habits in social progress.

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SECTION 4.

Describe the state of female education in China, Japan, India, Africa.

Contrast Christian and pagan ideals of education.

What is the fundamental necessity for educating womankind?

What is the practical necessity of all missionary education?

How applied to the education of girls?

How does an educated womanhood affect pagan social customs?

Discuss the value of educated mothers to the race.

SECTION 5.

Relate instances where missionary schools have been effective evangelizing agencies.

What effect does missionary education have upon the Moslem mind? Can it be called an evangelistic agency among them?

What is an "evangelism of preparation?"

How does the school appeal to the educated caste of a pagan land?

What educational necessity rests upon missions in making an effective native church?

Discuss the reaction of environment upon the evangelistic work of missions.

CHAPTER V.

SECTION 1.

Contrast the motives and benefits brought to a pagan society by the trader, soldier, missionary.

What is the community influence of the missionary and how does he exercise it?

Contrast the results of paternalism and those of a training in the arts of democracy.

Does white contact necessarily result in the decimation of native races? What kind of contact decimates? What kind elevates?

By what means does missionary influence affect the larger political, social, and commercial life of a people?

Discuss the civilizing power of the missionary in contrast to those of trade, war, and politics.

SECTION 2.

Are there any democracies among non-Christian governments? What type of rule prevails among them? How is justice administered?

APPENDIX

Quote various authorities on missionary influence in political progress.

Give instances of direct missionary work and influence in transforming the political life of a people.

What indirect influence does missionary work have on the political life of a people?

Discuss the influence of the missionary in the evolution of modern government in mission lands.

SECTION 3.

What is meant by "making two blades of grass grow where one grew before?"

What is the difference between "planting" and "rescuing" as a missionary program?

What part does the creation of new wants play in social progress? Relate how missionary work stimulates them and give instances of how the missionary has supplied them.

Narrate instances where he has become a "captain of industry."

What fundamental moral sense does he inject into trade and industry?

Discuss the relation of missionary work to material progress.

SECTION 4.

Enumerate ways in which the missionary becomes the pioneer of civilization. How does his work contribute to trade and commerce?

In what is the work of the trader inimical to missionary work? Give instances of conflict between them.

How does the missionary prepare a people for the innovations of civilization?

Enumerate examples of missionary trading companies.

What financial relation does the missionary hold to them? What special work do they do?

What special missionary enterprise is advocated by Dr. Josiah Strong? Would it be effective as a social influence?

Discuss the value of increased earning power to the higher arts of civilization.

SECTION 5.

Enumerate instances of international agreements, conferences, and federations.

Name some of the things that make against warfare in our time.

APPENDIX

Narrate how the nations are "preparing for war in times of peace." Who pays the bills finally?

What two things have been the chief causes of modern war?

Have missionaries ever directly brought on a war?

What of the Boxer rebellion?

Enumerate instances where the missionary has brought about peace.

What faith does the missionary have in the potentiality of the least of men? What attitude of mind does he cultivate that makes for peace?

Discuss the missionary as a factor in the uniting of the nations in bonds of comity and peace.

CHAPTER VI.

SECTION 1.

Give the number of unevangelized. What of the task among Moslems? In India? China? Japan? Africa? The unoccupied lands?

What particular promise does each of these missionary territories hold out?

What supreme call comes to the churches in face of the task?

Discuss the advantage of union among the churches for the sake of evangelizing the world.

SECTION 2.

What are the forces that make for Christian union?

What gave rise to the various denominations? Do the original causes still obtain?

Is there an advantage or disadvantage in divisions on the mission field? What advantage in union? How do our home divisions hinder unity on the mission field?

Enumerate spheres of work in which co-operation is found easy.

Give the great fundamentals on which all churches agree.

Discuss the practicability of a union of churches on the mission field.

SECTION 3.

What force will bring union? What is meant by an "overpowering common objective?" What are the first steps to union?

Enumerate the great standing conferences of missionaries: The permanent Boards of Arbitration.

Tell of the Methodist and Presbyterian division of the field in Korea. What approach to union is found in West China? In India?

APPENDIX

Enumerate instances of a union support of schools; of union within great denominational families.

What specific efforts are being made for "geographical union?" Tell of the South India United Church.

Discuss the "overpowering common objective" as a means to Christian union.

SECTION 4.

What is John R. Mott's judgment on the question of unity? What economic gain would come to missionary work through union?

Enumerate specific opportunities that call for a conservation of forces. What notable modern movements are opening work and preparing the way? What great need of a gospel of peace?

Why should the native church be a united church? What sacrifice will it cost the church at home?

Discuss the value of a united versus a divided native church.

SECTION 5.

Is the intent of the Savior's prayer for unity or for actual union?

What was the attitude of the early leaders in the Reformation toward missions?

Enumerate ways in which the world-wide spirit of unity is manifesting itself. How is it manifesting itself in the churches at home? What are the chief deterrents?

How have divisions hindered the church in doing social work? How would union help? Contrast Catholicism and Protestantism in the direct work of financing philanthropic enterprises. Why is the former strongest in it?

What demand does social progress upon the mission field make upon the church? Is the church awakening to its social duty? What effect will it have upon Christian union?

Discuss the social work of Christianity as a force making for Christian union.

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AND

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sume that your remarks on Man are those to which you alluded in your note. If you had not told me I should have thought that they had been added by some one else. As you expected, I differ grievously from you, and I am very sorry for it. I can see no necessity for calling in an additional and proximate cause in regard to man.* But the subject is too long for a letter. I have been particularly glad to read your discussion because I am now writing and thinking much about man.

I hope that your Malay book sells well; I was extremely pleased with the article in the 'Quarterly Journal of Science,' inasmuch as it is thoroughly appreciative of your work: alas! you will probably agree with what the writer says about the uses of the bamboo.

I hear that there is also a good article in the *Saturday Review*, but have heard nothing more about it. Believe me my dear Wallace,

Yours ever sincerely,

CH. DARWIN.

C. Darwin to C. Lyell.

Down, May 4 [1869].

MY DEAR LYELL,—I have been applied to for some photographs (carte de visite) to be copied to ornament the diplomas of honorary members of a new Society in Servia! Will you give me one for this purpose? I possess only a full-length one of you in my own album, and the face is too small, I think, to be copied.

I hope that you get on well with your work, and have satisfied yourself on the difficult point of glacier lakes. Thank

* Mr. Wallace points out that any one acquainted merely with the "unaided productions of nature," might reasonably doubt whether a dray-horse, for example, could have been developed by the power of man directing the "action of the laws of variation, multiplication, and survival, for his own purpose. We know, however, that this has been done, and we must therefore admit the possibility that in the development of the human race, a higher intelligence has guided the same laws for nobler ends."

heaven, I have finished correcting the new edition of the 'Origin,' and am at my old work of Sexual Selection.

Wallace's article struck me as *admirable*; how well he brought out the revolution which you effected some 30 years ago. I thought I had fully appreciated the revolution, but I was astounded at the extracts from Cuvier. What a good sketch of natural selection! but I was dreadfully disappointed about Man, it seems to me incredibly strange . . . ; and had I not known to the contrary, would have sworn it had been inserted by some other hand. But I believe that you will not agree quite in all this.

My dear Lyell, ever yours sincerely,
C. DARWIN.

C. Darwin to J. L. A. de Quatrefages.

Down, May 28 [1869 or 1870].

DEAR SIR,—I have received and read your volume,* and am much obliged for your present. The whole strikes me as a wonderfully clear and able discussion, and I was much interested by it to the last page. It is impossible that any account of my views could be fairer, or, as far as space permitted, fuller, than that which you have given. The way in which you repeatedly mention my name is most gratifying to me. When I had finished the second part, I thought that you had stated the case so favourably that you would make more converts on my side than on your own side. On reading the subsequent parts I had to change my sanguine view. In these latter parts many of your strictures are severe enough, but all are given with perfect courtesy and fairness. I can truly say I would rather be criticised by you in this manner than praised by many others. I agree with some of your criticisms, but differ entirely from the remainder; but I will not trouble you with any remarks. I may, however, say, that you must have been deceived by the French translation,

* Essays reprinted from the 'Revue des Deux Mondes,' under the title 'Histoire Naturelle Générale,' &c., 1869.

as you infer that I believe that the Parus and the Nuthatch (or Sitta) are related by direct filiation. I wished only to show by an imaginary illustration, how either instincts or structures might first change. If you had seen *Canis Magellanicus* alive you would have perceived how foxlike its appearance is, or if you had heard its voice, I think that you would never have hazarded the idea that it was a domestic dog run wild; but this does not much concern me. It is curious how nationality influences opinion; a week hardly passes without my hearing of some naturalist in Germany who supports my views, and often puts an exaggerated value on my works; whilst in France I have not heard of a single zoologist, except M. Gaudry (and he only partially), who supports my views. But I must have a good many readers as my books are translated, and I must hope, notwithstanding your strictures, that I may influence some embryo naturalists in France.

You frequently speak of my good faith, and no compliment can be more delightful to me, but I may return you the compliment with interest, for every word which you write bears the stamp of your cordial love for the truth. Believe me, dear Sir, with sincere respect,

Yours very faithfully,

CHARLES DARWIN.

C. Darwin to T. H. Huxley.

Down, October 14 [1869].

MY DEAR HUXLEY,—I have been delighted to see your review of Hæckel,* and as usual you pile honours high on my head. But I write now (*requiring no answer*) to groan a little over what you have said about rudimentary organs.† Many heretics will take advantage of what you have said. I cannot

* A review of Haeckel's 'Schöpfungsgeschichte.' *The Academy*, 1869. Reprinted in 'Critiques and Addresses,' p. 303.

† In discussing Teleology and Haeckel's "Dysteleology," Prof. Huxley says:—"Such cases as the existence of lateral rudiments of toes, in the foot of a horse, place us in a dilemma. For either these rudiments are of no use to the animals, in which case . . . they surely ought to have dis-

but think that the explanation given at p. 541 of the last edition of the 'Origin' of the long retention of rudimentary organs and of their greater relative size during early life, is satisfactory. Their final and complete abortion seems to me a much greater difficulty. Do look in my 'Variations under Domestication,' vol. ii. p. 397, at what Pangenesis suggests on this head, though I did not dare to put in the 'Origin.' The passage bears also a little on the struggle between the molecules or gemmules.* There is likewise a word or two indirectly bearing on this subject at pp. 394-395. It won't take you five minutes, so do look at these passages. I am very glad that you have been bold enough to give your idea about Natural Selection amongst the molecules, though I can not quite follow you.

1870 AND BEGINNING OF 1871.

[My father wrote in his Diary :—"The whole of this year [1870] at work on the 'Descent of Man.' . . . Went to Press August 30, 1870."

The letters are again of miscellaneous interest, dealing, not only with his work, but also serving to indicate the course of his reading.]

C. Darwin to E. Ray Lankester.

Down, March 15 [1870].

MY DEAR SIR,—I do not know whether you will consider me a very troublesome man, but I have just finished your

appeared ; or they are of some use to the animal, in which case they are of no use as arguments against Teleology."—('Critiques and Addresses,' p. 308.)

* "It is a probable hypothesis, that what the world is to organisms in general, each organism is to the molecules of which it is composed. Multitudes of these having diverse tendencies, are competing with one another for opportunity to exist and multiply ; and the organism, as a whole, is as much the product of the molecules which are victorious as the Fauna, or Flora, of a country is the product of the victorious organic beings in it."—('Critiques and Addresses,' p. 309.)

book,* and can not resist telling you how the whole has much interested me. No doubt, as you say, there must be much speculation on such a subject, and certain results can not be reached; but all your views are highly suggestive, and to my mind that is high praise. I have been all the more interested as I am now writing on closely allied though not quite identical points. I was pleased to see you refer to my much despised child, 'Pangenesis,' who I think will some day, under some better nurse, turn out a fine stripling. It has also pleased me to see how thoroughly you appreciate (and I do not think that this is general with the men of science) H. Spencer; I suspect that hereafter he will be looked at as by far the greatest living philosopher in England; perhaps equal to any that have lived. But I have no business to trouble you with my notions. With sincere thanks for the interest which your work has given me,

I remain, yours very faithfully,

CH. DARWIN.

[The next letter refers to Mr. Wallace's 'Natural Selection' (1870), a collection of essays reprinted with certain alterations of which a list is given in the volume:]

C. Darwin to A. R. Wallace.

Down, April 20 [1870].

MY DEAR WALLACE,—I have just received your book, and read the preface. There never has been passed on me, or indeed on any one, a higher eulogium than yours. I wish that I fully deserved it. Your modesty and candour are very far from new to me. I hope it is a satisfaction to you to reflect—and very few things in my life have been more satisfactory to me—that we have never felt any jealousy towards each other, though in one sense rivals. I believe that I can say this of myself with truth, and I am absolutely sure that it is true of you.

* 'Comparative Longevity.'

You have been a good Christian to give a list of your additions, for I want much to read them, and I should hardly have had time just at present to have gone through all your articles. Of course I shall immediately read those that are new or greatly altered, and I will endeavour to be as honest as can reasonably be expected. Your book looks remarkably well got up.

Believe me, my dear Wallace, to remain,
Yours very cordially,
CH. DARWIN.

[Here follow one or two letters indicating the progress of the 'Descent of Man;' the woodcuts referred to were being prepared for that work.]

*C. Darwin to A. Günther.**

March 23, [1870?]

DEAR GÜNTHER,—As I do not know Mr. Ford's address, will you hand him this note, which is written solely to express my unbounded admiration of the woodcuts. I fairly gloat over them. The only evil is that they will make all the other woodcuts look very poor! They are all excellent, and for the feathers I declare I think it the most wonderful woodcut I ever saw; I can not help touching it to make sure that it is smooth. How I wish to see the two other, and even more important, ones of the feathers, and the four [of] reptiles, &c. Once again accept my very sincere thanks for all your kindness. I am greatly indebted to Mr. Ford. Engravings have always hitherto been my greatest misery, and now they are a real pleasure to me.

Yours very sincerely,
CH. DARWIN.

P. S.—I thought I should have been in press by this time, but my subject has branched off into sub-branches, which

* Dr. Günther, Keeper of Zoology in the British Museum.

have cost me infinite time, and heaven knows when I shall have all my MS ready; but I am never idle.

C. Darwin to A. Günther.

May 15 [1870].

MY DEAR DR. GÜNTHER,—Sincere thanks. Your answers are wonderfully clear and complete. I have some analogous questions on reptiles, &c., which I will send in a few days, and then I think I shall cause no more trouble. I will get the books you refer me to. The case of the *Solenostoma** is magnificent, so exactly analogous to that of those birds in which the female is the more gay, but ten times better for me, as she is the incubator. As I crawl on with the successive classes I am astonished to find how similar the rules are about the nuptial or "wedding dress" of all animals. The subject has begun to interest me in an extraordinary degree; but I must try not to fall into my common error of being too speculative. But a drunkard might as well say he would drink a little and not too much! My essay, as far as fishes, batrachians and reptiles are concerned, will be in fact yours, only written by me. With hearty thanks.

Yours very sincerely,

CH. DARWIN.

[The following letter is of interest, as showing the excessive care and pains which my father took in forming his opinion on a difficult point:]

C. Darwin to A. R. Wallace.

Down, September 23 [undated].

MY DEAR WALLACE,—I am very much obliged for all your trouble in writing me your long letter, which I will keep by

* In most of the *Lophobranchii* the male has a marsupial sack in which the eggs are hatched, and in these species the male is slightly brighter coloured than the female. But in *Solenostoma* the female is the hatcher, and is also the more brightly coloured.—'Descent of Man,' ii. 21.

me and ponder over. To answer it would require at least 200 folio pages! If you could see how often I have re-written some pages you would know how anxious I am to arrive as near as I can to the truth. I lay great stress on what I know takes place under domestication; I think we start with different fundamental notions on inheritance. I find it is most difficult, but not I think impossible, to see how, for instance, a few red feathers appearing on the head of a male bird, and which *are at first transmitted to both sexes*, could come to be transmitted to males alone. It is not enough that females should be produced from the males with red feathers, which should be destitute of red feathers; but these females must have a *latent tendency* to produce such feathers, otherwise they would cause deterioration in the red head-feathers of their male offspring. Such latent tendency would be shown by their producing the red feathers when old, or diseased in their ovaria. But I have no difficulty in making the whole head red if the few red feathers in the male from the first tended to be sexually transmitted. I am quite willing to admit that the female may have been modified, either at the same time or subsequently, for protection by the accumulation of variations limited in their transmission to the female sex. I owe to your writings the consideration of this latter point. But I cannot yet persuade myself that females *alone* have often been modified for protection. Should you grudge the trouble briefly to tell me whether you believe that the plainer head and less bright colours of ♀ chaffinch,* the less red on the head and less clean colours of ♀ goldfinch, the much less red on the breast of ♀ bull-finch, the paler crest of golden-crested wren, &c., have been acquired by them for protection. I cannot think so any more than I can that the considerable differences between ♀ and ♂ house sparrow, or much greater brightness of ♂ *Parus cæruleus* (both of which build under cover) than of ♀ *Parus*, are related to protection. I even mis-doubt much whether the less blackness of ♀ black-bird is for protection.

* The symbols ♂ & ♀ stand for male and female.

Again, can you give me reasons for believing that the moderate differences between the female pheasant, the female *Gallus bankiva*, the female black grouse, the pea-hen, the female partridge, [and their respective males,] have all special references to protection under slightly different conditions? I, of course, admit that they are all protected by dull colours, derived, as I think, from some dull-ground progenitor; and I account partly for their difference by partial transference of colour from the male and by other means too long to specify; but I earnestly wish to see reason to believe that each is specially adapted for concealment to its environment.

I grieve to differ from you, and it actually terrifies me and makes me constantly distrust myself. I fear we shall never quite understand each other. I value the cases of bright-coloured, incubating male fishes, and brilliant female butterflies, solely as showing that one sex may be made brilliant without any necessary transference of beauty to the other sex; for in these cases I cannot suppose that beauty in the other sex was checked by selection.

I fear this letter will trouble you to read it. A very short answer about your belief in regard to the ♀ finches and galinaceæ would suffice.

Believe me, my dear Wallace,

Yours very sincerely,

CH. DARWIN.

C. Darwin to J. D. Hooker.

Down, May 25 [1870].

. . . . Last Friday we all went to the Bull Hotel at Cambridge to see the boys, and for a little rest and enjoyment. The backs of the Colleges are simply paradisaical. On Monday I saw Sedgwick, who was most cordial and kind; in the morning I thought his brain was enfeebled; in the evening he was brilliant and quite himself. His affection and kindness charmed us all. My visit to him was in one way unfortunate; for after a long sit he proposed to take me to the museum, and I could not refuse, and in consequence he utterly

prostrated me; so that we left Cambridge next morning, and I have not recovered the exhaustion yet. Is it not humiliating to be thus killed by a man of eighty-six, who evidently never dreamed that he was killing me? As he said to me, "Oh, I consider you as a mere baby to me!" I saw Newton several times, and several nice friends of F.'s. But Cambridge without dear Henslow was not itself; I tried to get to the two old houses, but it was too far for me. . . .

*C. Darwin to B. J. Sullivan.**

Down, June 30 [1870].

MY DEAR SULIVAN,—It was very good of you to write to me so long a letter, telling me much about yourself and your children, which I was extremely glad to hear. Think what a benighted wretch I am, seeing no one and reading but little in the newspapers, for I did not know (until seeing the paper of your Natural History Society) that you were a K.C.B. Most heartily glad I am that the Government have at last appreciated your most just claim for this high distinction. On the other hand, I am sorry to hear so poor an account of your health; but you were surely very rash to do all that you did and then pass through so exciting a scene as a ball at the Palace. It was enough to have tired a man in robust health. Complete rest will, however, I hope, quite set you up again. As for myself, I have been rather better of late, and if nothing disturbs me I can do some hours' work every day. I shall this autumn publish another book partly on man, which I dare say many will decry as very wicked. I could have travelled to Oxford, but could no more have withstood the excitement of a commemoration† than I could a ball at

* Admiral Sir James Sullivan was a lieutenant on board the *Beagle*.

† This refers to an invitation to receive the honorary degree of D.C.L. He was one of those nominated for the degree by Lord Salisbury on assuming the office of Chancellor of the University of Oxford. The fact that the honour was declined on the score of ill-health was published in the *Oxford University Gazette*, June 17, 1870.

Buckingham Palace. Many thanks for your kind remarks about my boys. Thank God, all give me complete satisfaction; my fourth stands second at Woolwich, and will be an Engineer Officer at Christmas. My wife desires to be very kindly remembered to Lady Sullivan, in which I very sincerely join, and in congratulation about your daughter's marriage. We are at present solitary, for all our younger children are gone a tour in Switzerland. I had never heard a word about the success of the T. del Fuego mission. It is most wonderful, and shames me, as I always prophesied utter failure. It is a grand success. I shall feel proud if your Committee think fit to elect me an honorary member of your society. With all good wishes and affectionate remembrances of ancient days,

Believe me, my dear Sullivan,

Your sincere friend,

CH. DARWIN.

[My father's connection with the South American Mission, which is referred to in the above letter, has given rise to some public comment, and has been to some extent misunderstood. The Archbishop of Canterbury, speaking at the annual meeting of the South American Missionary Society, April 21st, 1885,* said that the Society "drew the attention of Charles Darwin, and made him, in his pursuit of the wonders of the kindom of nature, realise that there was another kingdom just as wonderful and more lasting." Some discussion on the subject appeared in the *Daily News* of April 23rd, 24th, 29th, 1885, and finally Admiral Sir James Sullivan, on April 24th, wrote to the same journal, giving a clear account of my father's connection with the Society:—

"Your article in the *Daily News* of yesterday induces me to give you a correct statement of the connection between the South American Missionary Society and Mr. Charles Darwin, my old friend and shipmate for five years. I have been

* I quote a 'Leaflet,' published by the Society.

closely connected with the Society from the time of Captain Allen Gardiner's death, and Mr. Darwin has often expressed to me his conviction that it was utterly useless to send Missionaries to such a set of savages as the Fuegians, probably the very lowest of the human race. I had always replied that I did not believe any human beings existed too low to comprehend the simple message of the Gospel of Christ. After many years, I think about 1869,* but I cannot find the letter, he wrote to me that the recent accounts of the Mission proved to him that he had been wrong and I right in our estimates of the native character, and the possibility of doing them good through Missionaries; and he requested me to forward to the Society an enclosed cheque for £5, as a testimony of the interest he took in their good work. On June 6th, 1874, he wrote: 'I am very glad to hear so good an account of the Fuegians, and it is wonderful.' On June 10th, 1879: 'The progress of the Fuegians is wonderful, and had it not occurred would have been to me quite incredible.' On January 3rd, 1880: 'Your extracts' [from a journal] 'about the Fuegians are extremely curious, and have interested me much. I have often said that the progress of Japan was the greatest wonder in the world, but I declare that the progress of Fuegia is almost equally wonderful. On March 20th, 1881: 'The account of the Fuegians interested not only me, but all my family. It is truly wonderful what you have heard from Mr. Bridges about their honesty and their language. I certainly should have predicted that not all the Missionaries in the world could have done what has been done.' On December 1st, 1881, sending me his annual subscription to the Orphanage at the Mission Station, he wrote: 'Judging from the *Missionary Journal*, the Mission in Tierra del Fuego seems going on quite wonderfully well.'"]

* It seems to have been in 1867.

C. Darwin to John Lubbock.

Down, July 17, 1870.

MY DEAR LUBBOCK,—As I hear that the Census will be brought before the House to-morrow, I write to say how much I hope that you will express your opinion on the desirability of queries in relation to consanguineous marriages being inserted. As you are aware, I have made experiments on the subject during several years; *and it is my clear conviction that there is now ample evidence of the existence of a great physiological law, rendering an enquiry with reference to mankind of much importance. In England and many parts of Europe the marriages of cousins are objected to from their supposed injurious consequences; but this belief rests on no direct evidence. It is therefore manifestly desirable that the belief should either be proved false, or should be confirmed,* so that in this latter case the marriages of cousins might be discouraged. If the proper queries are inserted, the returns would show whether married cousins have in their households on the night of the census as many children as have parents who are not related; and should the number prove fewer, we might safely infer either lessened fertility in the parents, or which is more probable, lessened vitality in the offspring.

It is, moreover, much to be wished that the truth of the often repeated assertion that consanguineous marriages lead to deafness, and dumbness, blindness, &c., should be ascertained; and all such assertions could be easily tested by the returns from a single census.

Believe me,

Yours very sincerely,

CHARLES DARWIN.

[When the Census Act was passing through the House of Commons, Sir John Lubbock and Dr. Playfair attempted to carry out this suggestion. The question came to a division, which was lost, but not by many votes.

The subject of cousin marriages was afterwards investigated by my brother.* The results of this laborious piece of work were negative; the author sums up in the sentence:—

“My paper is far from giving any thing like a satisfactory solution of the question as to the effects of consanguineous marriages, but it does, I think, show that the assertion that this question has already been set at rest, cannot be substantiated.”]

* “Marriages between First Cousins in England, and their Effects,”
By George Darwin. ‘Journal of the Statistical Society,’ June, 1875.

CHAPTER VII.

PUBLICATION OF THE 'DESCENT OF MAN.'

WORK ON 'EXPRESSION.'

1871-1873.

[THE last revise of the 'Descent of Man' was corrected on January 15th, 1871, so that the book occupied him for about three years. He wrote to Sir J. Hooker: "I finished the last proofs of my book a few days ago, the work half-killed me, and I have not the most remote idea whether the book is worth publishing."

He also wrote to Dr. Gray:—

"I have finished my book on the 'Descent of Man,' &c., and its publication is delayed only by the Index: when published, I will send you a copy, but I do not know that you will care about it. Parts, as on the moral sense, will, I dare say, aggravate you, and if I hear from you, I shall probably receive a few stabs from your polished stiletto of a pen."

The book was published on February 24, 1871. 2500 copies were printed at first, and 5000 more before the end of the year. My father notes that he received for this edition £1470. The letters given in the present chapter deal with its reception, and also with the progress of the work on Expression. The letters are given, approximately, in chronological order, an arrangement which necessarily separates letters of kindred subject-matter, but gives perhaps a truer picture of the mingled interests and labours of my father's life.

Nothing can give a better idea (in small compass) of the

growth of Evolutionism and its position at this time, than a quotation from Mr. Huxley* :—

“The gradual lapse of time has now separated us by more than a decade from the date of the publication of the ‘Origin of Species ;’ and whatever may be thought or said about Mr. Darwin’s doctrines, or the manner in which he has propounded them, this much is certain, that in a dozen years the ‘Origin of Species’ has worked as complete a revolution in Biological Science as the ‘Principia’ did in Astronomy ;” and it has done so, “because, in the words of Helmholtz, it contains ‘an essentially new creative thought.’ And, as time has slipped by, a happy change has come over Mr. Darwin’s critics. The mixture of ignorance and insolence which at first characterised a large proportion of the attacks with which he was assailed, is no longer the sad distinction of anti-Darwinian criticism.”

A passage in the Introduction to the ‘Descent of Man’ shows that the author recognised clearly this improvement in the position of Evolution. “When a naturalist like Carl Vogt ventures to say in his address, as President of the National Institution of Geneva (1869), ‘*personne, en Europe au moins, n’ose plus soutenir la création indépendante et de toutes pièces, des espèces,*’ it is manifest that at least a large number of naturalists must admit that species are the modified descendants of other species ; and this especially holds good with the younger and rising naturalists. . . . Of the older and honoured chiefs in natural science, many, unfortunately, are still opposed to Evolution in every form.”

In Mr. James Hague’s pleasantly written article, “A Reminiscence of Mr. Darwin” (‘Harper’s Magazine,’ October 1884), he describes a visit to my father “early in 1871,”† shortly after the publication of the ‘Descent of Man.’ Mr. Hague represents my father as “much impressed by the gen-

* ‘Contemporary Review,’ 1871.

† It must have been at the end of February, within a week after the publication of the book.

eral assent with which his views had been received," and as remarking that "everybody is talking about it without being shocked."

Later in the year the reception of the book is described in different language in the 'Edinburgh Review':* "On every side it is raising a storm of mingled wrath, wonder, and admiration."

With regard to the subsequent reception of the 'Descent of Man,' my father wrote to Dr. Dohrn, February 3, 1872:—

"I did not know until reading your article, † that my 'Descent of Man' had excited so much *furor* in Germany. It has had an immense circulation in this country and in America, but has met the approval of hardly any naturalists as far as I know. Therefore I suppose it was a mistake on my part to publish it; but, anyhow, it will pave the way for some better work."

The book on the 'Expression of the Emotions' was begun on January 17th, 1871, the last proof of the 'Descent of Man' having been finished on January 15th. The rough copy was finished by April 27th, and shortly after this (in June) the work was interrupted by the preparation of a sixth edition of the 'Origin.' In November and December the proofs of the 'Expression' book were taken in hand, and occupied him until the following year, when the book was published.

Some references to the work on Expression have occurred in letters already given, showing that the foundation of the book was, to some extent, laid down for some years before he began to write it. Thus he wrote to Dr. Asa Gray, April 15, 1867:—

"I have been lately getting up and looking over my old notes on Expression, and fear that I shall not make so much of my hobby-horse as I thought I could; nevertheless, it

* July 1871. An adverse criticism. The reviewer sums up by saying that: "Never perhaps in the history of philosophy have such wide generalisations been derived from such a small basis of fact."

† In 'Das Ausland.'

seems to me a curious subject which has been strangely neglected."

It should, however, be remembered that the subject had been before his mind, more or less, from 1837 or 1838, as I judge from entries in his early note-books. It was in December, 1839, that he began to make observations on children.

The work required much correspondence, not only with missionaries and others living among savages, to whom he sent his printed queries, but among physiologists and physicians. He obtained much information from Professor Donders, Sir W. Bowman, Sir James Paget, Dr. W. Ogle, Dr. Crichton Browne, as well as from other observers.

The first letter refers to the 'Descent of Man.']

C. Darwin to A. R. Wallace.

Down, January 30 [1871].

MY DEAR WALLACE,—Your note * has given me very great pleasure, chiefly because I was so anxious not to treat you with the least disrespect, and it is so difficult to speak fairly when differing from any one. If I had offended you, it would have grieved me more than you will readily believe. Secondly, I am greatly pleased to hear that Vol. I. interests

* In the note referred to, dated January 27, Mr. Wallace wrote:—"Many thanks for your first volume which I have just finished reading through with the greatest pleasure and interest; and I have also to thank you for the great tenderness with which you have treated me and my heresies."

The heresy is the limitation of natural selection as applied to man. My father wrote ('Descent of Man,' i. p. 137):—"I cannot therefore understand how it is that Mr. Wallace maintains that 'natural selection could only have endowed the savage with a brain a little superior to that of an ape.'" In the above quoted letter Mr. Wallace wrote:—"Your chapters on 'Man' are of intense interest, but as touching my special heresy not as yet altogether convincing, though of course I fully agree with every word and every argument which goes to prove the evolution or development of man out of a lower form."

you ; I have got so sick of the whole subject that I felt in utter doubt about the value of any part. I intended, when speaking of females not having been specially modified for protection, to include the prevention of characters acquired by the ♂ being transmitted to ♀ ; but I now see it would have been better to have said "specially acted on," or some such term. Possibly my intention may be clearer in Vol. II. Let me say that my conclusions are chiefly founded on the consideration of all animals taken in a body, bearing in mind how common the rules of sexual differences appear to be in all classes. The first copy of the chapter on Lepidoptera agreed pretty closely with you. I then worked on, came back to Lepidoptera, and thought myself compelled to alter it—finished Sexual Selection and for the last time went over Lepidoptera, and again I felt forced to alter it. I hope to God there will be nothing disagreeable to you in Vol. II., and that I have spoken fairly of your views ; I am fearful on this head, because I have just read (but not with sufficient care) Mivart's book,* and I feel *absolutely certain* that he meant to be fair (but he was stimulated by theological fervour) ; yet I do not think he has been quite fair. . . . The part which, I think, will have most influence is where he gives the whole series of cases like that of the whalebone, in which we cannot explain the gradational steps ; but such cases have no weight on my mind—if a few fish were extinct, who on earth would have ventured even to conjecture that lungs had originated in a swim-bladder ? In such a case as the Thylacine, I think he was bound to say that the resemblance of the jaw to that of the dog is superficial ; the number and correspondence and development of teeth being widely different. I think again when speaking of the necessity of altering a number of characters together, he ought to have thought of man having power by selection to modify simultaneously or almost simultaneously many points, as in making a greyhound or racehorse—as enlarged upon in my 'Domes-

* 'The Genesis of Species,' by St. G. Mivart, 1871.

tic Animals.' Mivart is savage or contemptuous about my "moral sense," and so probably will you be. I am extremely pleased that he agrees with my position, *as far as animal nature is concerned*, of man in the series; or if anything, thinks I have erred in making him too distinct.

Forgive me for scribbling at such length. You have put me quite in good spirits; I did so dread having been unintentionally unfair towards your views. I hope earnestly the second volume will escape as well. I care now very little what others say. As for our not quite agreeing, really in such complex subjects, it is almost impossible for two men who arrive independently at their conclusions to agree fully, it would be unnatural for them to do so.

Yours ever, very sincerely,

CH. DARWIN.

[Professor Haeckel seems to have been one of the first to write to my father about the 'Descent of Man.' I quote from his reply:—

"I must send you a few words to thank you for your interesting, and I may truly say, charming letter. I am delighted that you approve of my book, as far as you have read it. I felt very great difficulty and doubt how often I ought to allude to what you have published; strictly speaking every idea, although occurring independently to me, if published by you previously ought to have appeared as if taken from your works, but this would have made my book very dull reading; and I hoped that a full acknowledgment at the beginning would suffice.* I cannot tell you how glad I am to find that I have expressed my high admiration of your labours with

* In the introduction to the 'Descent of Man' the author wrote:—"This last naturalist [Haeckel] . . . has recently . . . published his 'Natürliche Schöpfungs-geschichte,' in which he fully discusses the genealogy of man. If this work had appeared before my essay had been written, I should probably never have completed it. Almost all the conclusions at which I have arrived, I find confirmed by this naturalist, whose knowledge on many points is much fuller than mine."

sufficient clearness; I am sure that I have not expressed it too strongly."]

C. Darwin to A. R. Wallace.

Down, March 16, 1871.

MY DEAR WALLACE,—I have just read your grand review.* It is in every way as kindly expressed towards myself as it is excellent in matter. The Lyells have been here, and Sir C. remarked that no one wrote such good scientific reviews as you, and as Miss Buckley added, you delight in picking out all that is good, though very far from blind to the bad. In all this I most entirely agree. I shall always consider your review as a great honour; and however much my book may hereafter be abused, as no doubt it will be, your review will console me, notwithstanding that we differ so greatly. I will keep your objections to my views in my mind, but I fear that the latter are almost stereotyped in my mind. I thought for long weeks about the inheritance and selection difficulty, and covered quires of paper with notes in trying to get out of it, but could not, though clearly seeing that it would be a great relief if I could. I will confine myself to two or three remarks. I have been much impressed with what you urge against colour† in the case of insects, having been acquired through sexual selection. I always saw that the evidence was very weak; but I still think, if it be admitted that the musical instruments of insects have been gained through sexual selection, that there is not the least improbability in colour having been thus gained. Your argument with respect to the denudation of mankind and also to insects, that taste on the part of one sex would have to re-

* *Academy*, March 15, 1871.

† Mr. Wallace says that the pairing of butterflies is probably determined by the fact that one male is stronger-winged, or more pertinacious than the rest, rather than by the choice of the females. He quotes the case of caterpillars which are brightly coloured and yet sexless. Mr. Wallace also makes the good criticism that the 'Descent of Man' consists of two books mixed together.

main nearly the same during many generations, in order that sexual selection should produce any effect, I agree to ; and I think this argument would be sound if used by one who denied that, for instance, the plumes of birds of Paradise had been so gained. I believe you admit this, and if so I do not see how your argument applies in other cases. I have recognized for some short time that I have made a great omission in not having discussed, as far as I could, the acquisition of taste, its inherited nature, and its permanence within pretty close limits for long periods.

[With regard to the success of the 'Descent of Man,' I quote from a letter to Professor Ray Lankester (March 22, 1871):—

"I think you will be glad to hear, as a proof of the increasing liberality of England, that my book has sold wonderfully . . . and as yet no abuse (though some, no doubt, will come, strong enough), and only contempt even in the poor old *Athenæum*."

As to reviews that struck him he wrote to Mr. Wallace (March 24, 1871):—

"There is a very striking second article on my book in the *Pall Mall*. The articles in the *Spectator** have also interested me much."

On March 20 he wrote to Mr. Murray:—

"Many thanks for the *Nonconformist* [March 8, 1871]. I like to see all that is written, and it is of some real use. If you hear of reviewers in out-of-the-way papers, especially the religious, as *Record*, *Guardian*, *Tablet*, kindly inform me. It is wonderful that there has been no abuse† as yet, but I

* *Spectator*, March 11 and 18, 1871. With regard to the evolution of conscience the reviewer thinks that my father comes much nearer to the "kernel of the psychological problem" than many of his predecessors. The second article contains a good discussion of the bearing of the book on the question of design, and concludes by finding in it a vindication of Theism more wonderful than that in Paley's 'Natural Theology.'

† "I feel a full conviction that my chapter on man will excite attention

suppose I shall not escape. On the whole, the reviews have been highly favourable."

The following extract from a letter to Mr. Murray (April 13, 1871) refers to a review in the *Times*.†

"I have no idea who wrote the *Times* review. He has no knowledge of science, and seems to me a wind-bag full of metaphysics and classics, so that I do not much regard his adverse judgment, though I suppose it will injure the sale."

A review of the 'Descent of Man,' which my father spoke of as "capital," appeared in the *Saturday Review* (Mar. 4 and 11, 1871). A passage from the first notice (Mar. 4) may be quoted in illustration of the broad basis as regards general acceptance, on which the doctrine of Evolution now stood: "He claims to have brought man himself, his origin and constitution, within that unity which he had previously sought to trace through all lower animal forms. The growth of opinion in the interval, due in chief measure to his own intermediate works, has placed the discussion of this problem in a position very much in advance of that held by it fifteen years ago. The problem of Evolution is hardly any longer to be treated as one of first principles; nor has Mr. Darwin to do battle for a first hearing of his central hypothesis, upborne as it is by a phalanx of names full of distinction and promise, in either hemisphere."

The infolded point of the human ear, discovered by Mr. Woolner, and described in the 'Descent of Man,' seems especially to have struck the popular imagination; my father wrote to Mr. Woolner:—

and plenty of abuse, and I suppose abuse is as good as praise for selling a book."—(From a letter to Mr. Murray, Jan. 31, 1867.)

† *Times*, April 7 and 8, 1871. The review is not only unfavourable as regards the book under discussion, but also as regards Evolution in general, as the following citation will show: "Even had it been rendered highly probable, which we doubt, that the animal creation has been developed into its numerous and widely different varieties by mere evolution, it would still require an independent investigation of overwhelming force and completeness to justify the presumption that man is but a term in this self-evolving series."

"The tips to the ears have become quite celebrated. One reviewer ('Nature') says they ought to be called, as I suggested in joke, *Angulus Woolnerianus*.* A German is very proud to find that he has the tips well developed, and I believe will send me a photograph of his ears."]

C. Darwin to John Brodie Innes.†

Down, May 29 [1871].

MY DEAR INNES,—I have been very glad to receive your pleasant letter, for to tell you the truth, I have sometimes wondered whether you would not think me an outcast and a reprobate after the publication of my last book ['Descent'].‡ I do not wonder at all at your not agreeing with me, for a good many professed naturalists do not. Yet when I see in how extraordinary a manner the judgment of naturalists has changed since I published the 'Origin,' I feel convinced that there will be in ten years quite as much unanimity about man, as far as his corporeal frame is concerned. . . .

[The following letters addressed to Dr. Ogle deal with the progress of the work on expression.]

Down, March 12 [1871].

MY DEAR DR. OGLE,—I have received both your letters, and they tell me all that I wanted to know in the clearest possible way, as, indeed, all your letters have ever done. I thank you cordially. I will give the case of the murderer * in my hobby-horse essay on expression. I fear that the Eustachian tube question must have cost you a deal of labour ;

* 'Nature' Ap. 6, 1871. The term suggested is *Angulus Woolnerii*.

† Rev. J. Brodie Innes, of Milton Brodie, formerly Vicar of Down.

‡ In a former letter of my father's to Mr. Innes :—"We often differed, but you are one of those rare mortals from whom one can differ and yet feel no shade of animosity, and that is a thing which I should feel very proud of, if any one could say it of me."

* 'Expression of the Emotions,' p. 294. The arrest of a murderer, as witnessed by Dr. Ogle in a hospital.

it is quite a complete little essay. It is pretty clear that the mouth is not opened under surprise merely to improve the hearing. Yet why do deaf men generally keep their mouths open? The other day a man here was mimicking a deaf friend, leaning his head forward and sideways to the speaker, with his mouth well open; it was a lifelike representation of a deaf man. Shakespeare somewhere says: "Hold your breath, listen" or "hark," I forget which. Surprise hurries the breath, and it seems to me one can breathe, at least hurriedly, much quieter through the open mouth than through the nose. I saw the other day you doubted this. As objection is your province at present, I think breathing through the nose ought to come within it likewise, so do pray consider this point, and let me hear your judgment. Consider the nose to be a flower to be fertilised, and then you will make out all about it.* I have had to allude to your paper on 'Sense of Smell;' † is the paging right, namely, 1, 2, 3? If not, I protest by all the gods against the plan followed by some, of having presentation copies falsely paged; and so does Rolleston, as he wrote to me the other day. In haste.

Yours very sincerely,

C. DARWIN.

C. Darwin to W. Ogle.

Down, March 25 [1871].

MY DEAR DR. OGLE,—You will think me a horrid bore, but I beg you, *in relation to a new point for observation*, to imagine as well as you can that you suddenly come across some dreadful object, and act with a sudden little start, a *shudder of horror*; please do this once or twice, and observe yourself as well as you can, and *afterwards* read the rest of this note, which I have consequently pinned down. I find, to my surprise, whenever I act thus my platysma contracts.

* Dr. Ogle had corresponded with my father on his own observations on the fertilisation of flowers.

† Medico-chirurg. Trans. liii.

Does yours? (N.B.—See what a man will do for science; I began this note with a horrid fib, namely, that I want you to attend to a new point.*) I will try and get some persons thus to act who are so lucky as not to know that they even possess this muscle, so troublesome for any one making out about expression. Is a shudder akin to the rigor or shivering before fever? If so, perhaps the platysma could be observed in such cases. Paget told me that he had attended much to shivering, and had written in MS. on the subject, and been much perplexed about it. He mentioned that passing a catheter often causes shivering. Perhaps I will write to him about the platysma. He is always most kind in aiding me in all ways, but he is so overworked that it hurts my conscience to trouble him, for I have a conscience, little as you have reason to think so. Help me if you can, and forgive me. Your murderer case has come in splendidly as the acme of prostration from fear.

Yours very sincerely,

CH. DARWIN.

C. Darwin to Dr. Ogle.

Down, April 29 [1871].

MY DEAR DR. OGLE,—I am truly obliged for all the great trouble which you have so kindly taken. I am sure you have no cause to say that you are sorry you can give me no definite information, for you have given me far more than I ever expected to get. The action of the platysma is not very important for me, but I believe that you will fully understand (for I have always fancied that our minds were very similar) the intolerable desire I had not to be utterly baffled. Now I know that it sometimes contracts from fear and from shuddering, but not apparently from a prolonged state of fear such as the insane suffer. . . .

* The point was doubtless described as a new one, to avoid the possibility of Dr. Ogle's attention being directed to the platysma, a muscle which had been the subject of discussion in other letters.

[Mr. Mivart's 'Genesis of Species,'—a contribution to the literature of Evolution, which excited much attention—was published in 1871, before the appearance of the 'Descent of Man.' To this book the following letter (June 21, 1871) from the late Chauncey Wright * to my father refers] :

"I send . . . revised proofs of an article which will be published in the July number of the 'North American Review,' sending it in the hope that it will interest or even be of greater value to you. Mr. Mivart's book ['Genesis of Species'] of which this article is substantially a review, seems to me a very good background from which to present the considerations which I have endeavoured to set forth in the article, in defence and illustration of the theory of Natural Selection. My special purpose has been to contribute to the theory by placing it in its proper relations to philosophical inquiries in general." †

With regard to the proofs received from Mr. Wright, my father wrote to Mr. Wallace :]

Down, July 9 [1871].

MY DEAR WALLACE,—I send by this post a review by Chauncey Wright, as I much want your opinion of it as soon as you can send it. I consider you an incomparably better critic than I am. The article, though not very clearly written, and poor in parts from want of knowledge, seems to me admirable. Mivart's book is producing a great effect

* Chauncey Wright was born at Northampton, Massachusetts, Sept. 20, 1830, and came of a family settled in that town since 1654. He became in 1852 a computer in the Nautical Almanac office at Cambridge, Mass., and lived a quiet uneventful life, supported by the small stipend of his office, and by what he earned from his occasional articles, as well as by a little teaching. He thought and read much on metaphysical subjects, but on the whole with an outcome (as far as the world was concerned) not commensurate to the power of his mind. He seems to have been a man of strong individuality, and to have made a lasting impression on his friends. He died in Sept., 1875.

† 'Letters of Chauncey Wright,' by J. B. Thayer. Privately printed, 1878, p. 230.

against Natural Selection, and more especially against me. Therefore if you think the article even somewhat good I will write and get permission to publish it as a shilling pamphlet, together with the MS. additions (enclosed), for which there was not room at the end of the review. . . .

I am now at work at a new and cheap edition of the 'Origin,' and shall answer several points in Mivart's book, and introduce a new chapter for this purpose; but I treat the subject so much more concretely, and I dare say less philosophically, than Wright, that we shall not interfere with each other. You will think me a bigot when I say, after studying Mivart, I was never before in my life so convinced of the *general* (*i. e.* not in detail) truth of the views in the 'Origin.' I grieve to see the omission of the words by Mivart, detected by Wright.* I complained to Mivart that in two cases he quotes only the commencement of sentences by me, and thus modifies my meaning; but I never supposed he would have omitted words. There are other cases of what I consider unfair treatment. I conclude with sorrow that though he means to be honourable he is so bigoted that he cannot act fairly. . . .

C. Darwin to Chauncey Wright.

Down, July 14, 1871.

MY DEAR SIR,—I have hardly ever in my life read an article which has given me so much satisfaction as the review which you have been so kind as to send me. I agree to almost everything which you say. Your memory must be wonderfully accurate, for you know my works as well as I do myself, and your power of grasping other men's thoughts is something quite surprising; and this, as far as my experience

* 'North American Review,' vol. 113, pp. 83, 84. Chauncey Wright points out that the words omitted are "essential to the point on which he [Mr. Mivart] cites Mr. Darwin's authority." It should be mentioned that the passage from which words are omitted is not given within inverted commas by Mr. Mivart.

goes, is a very rare quality. As I read on I perceived how you have acquired this power, viz. by thoroughly analyzing each word.

. . . Now I am going to beg a favour. Will you provisionally give me permission to reprint your article as a shilling pamphlet? I ask only provisionally, as I have not yet had time to reflect on the subject. It would cost me, I fancy, with advertisements, some £20 or £30; but the worst is that, as I hear, pamphlets never will sell. And this makes me doubtful. Should you think it too much trouble to send me a title *for the chance*? The title ought, I think, to have Mr. Mivart's name on it.

. . . If you grant permission and send a title, you will kindly understand that I will first make further enquiries whether there is any chance of a pamphlet being read.

Pray believe me yours very sincerely obliged,

CH. DARWIN.

[The pamphlet was published in the autumn, and on October 23 my father wrote to Mr. Wright:—

"It pleases me much that you are satisfied with the appearance of your pamphlet. I am sure it will do our cause good service; and this same opinion Huxley has expressed to me. ('Letters of Chauncey Wright,' p. 235)"]

C. Darwin to A. R. Wallace.

Down, July 12 [1871].

. . . . I feel very doubtful how far I shall succeed in answering Mivart, it is so difficult to answer objections to doubtful points, and make the discussion readable. I shall make only a selection. The worst of it is, that I cannot possibly hunt through all my references for isolated points, it would take me three weeks of intolerably hard work. I wish I had your power of arguing clearly. At present I feel sick of everything, and if I could occupy my time and forget my daily discomforts, or rather miseries, I would never publish

another word. But I shall cheer up, I dare say, soon, having only just got over a bad attack. Farewell; God knows why I bother you about myself. I can say nothing more about missing-links than what I have said. I should rely much on pre-silurian times; but then comes Sir W. Thomson like an odious spectre. Farewell.

. . . There is a most cutting review of me in the 'Quarterly';* I have only read a few pages. The skill and style make me think of Mivart. I shall soon be viewed as the most despicable of men. This 'Quarterly Review' tempts me to republish Ch. Wright, even if not read by any one, just to show some one will say a word against Mivart, and that his (*i.e.* Mivart's) remarks ought not to be swallowed without some reflection. . . . God knows whether my strength and spirit will last out to write a chapter versus Mivart and others; I do so hate controversy and feel I shall do it so badly.

[The above-mentioned 'Quarterly' review was the subject of an article by Mr. Huxley in the November number of the 'Contemporary Review.' Here, also, are discussed Mr. Wallace's 'Contribution to the Theory of Natural Selection,' and the second edition of Mr. Mivart's 'Genesis of Species.' What follows is taken from Mr. Huxley's article. The 'Quarterly' reviewer, though being to some extent an evolutionist, believes that Man "differs more from an elephant or a gorilla, than do these from the dust of the earth on which they tread." The reviewer also declares that my father has "with needless opposition, set at naught the first principles of both philosophy and religion." Mr. Huxley passes from the 'Quarterly' reviewer's further statement, that there is no necessary opposition between evolution and religion, to the more definite position taken by Mr. Mivart, that the orthodox authorities of the Roman Catholic Church agree in distinctly asserting derivative creation, so that "their teachings harmonize with all that modern science can possibly require." Here Mr. Huxley felt the want of that "study of Christian

* July 1871.

philosophy " (at any rate, in its Jesuitic garb), which Mr. Mivart speaks of, and it was a want he at once set to work to fill up. He was then staying at St. Andrews, whence he wrote to my father :—

"By great good luck there is an excellent library here, with a good copy of Suarez,* in a dozen big folios. Among these I dived, to the great astonishment of the librarian, and looking into them 'as the careful robin eyes the delver's toil' (*vide* 'Idylls'), I carried off the two venerable clasped volumes which were most promising." Even those who know Mr. Huxley's unrivalled power of tearing the heart out of a book must marvel at the skill with which he has made Suarez speak on his side. "So I have come out," he wrote, "in the new character of a defender of Catholic orthodoxy, and upset Mivart out of the mouth of his own prophet."

The remainder of Mr. Huxley's critique is largely occupied with a dissection of the 'Quarterly' reviewer's psychology, and his ethical views. He deals, too, with Mr. Wallace's objections to the doctrine of Evolution by natural causes when applied to the mental faculties of Man. Finally, he devotes a couple of pages to justifying his description of the 'Quarterly' reviewer's "treatment of Mr. Darwin as alike unjust and unbecoming."

It will be seen that the two following letters were written before the publication of Mr. Huxley's article.]

C. Darwin to T. H. Huxley.

Down, September 21 [1871].

MY DEAR HUXLEY,—Your letter has pleased me in many ways, to a wonderful degree. . . . What a wonderful man you are to grapple with those old metaphisico-divinity books! It quite delights me that you are going to some extent to answer and attack Mivart. His book, as you say, has produced a great effect; yesterday I perceived the reverberations from it, even from Italy. It was this that made me ask Chauncey

* The learned Jesuit on whom Mr. Mivart mainly relies.

Wright to publish at my expense his article, which seems to me very clever, though ill-written. He has not knowledge enough to grapple with Mivart in detail. I think there can be no shadow of doubt that he is the author of the article in the 'Quarterly Review' . . . I am preparing a new edition of the 'Origin,' and shall introduce a new chapter in answer to miscellaneous objections, and shall give up the greater part to answer Mivart's cases of difficulty of incipient structures being of no use : and I find it can be done easily. He never states his case fairly, and makes wonderful blunders. . . . The pendulum is now swinging against our side, but I feel positive it will soon swing the other way ; and no mortal man will do half as much as you in giving it a start in the right direction, as you did at the first commencement. God forgive me for writing so long and egotistical a letter ; but it is your fault, for you have so delighted me ; I never dreamed that you would have time to say a word in defence of the cause which you have so often defended. It will be a long battle, after we are dead and gone. . . . Great is the power of misrepresentation. . . .

C. Darwin to T. H. Huxley.

Down, September 30 [1871].

MY DEAR HUXLEY,—It was very good of you to send the proof-sheets, for I was *very* anxious to read your article. I have been delighted with it. How you do smash Mivart's theology : it is almost equal to your article versus Comte,—* that never can be transcended. . . . But I have been pre-eminently glad to read your discussion on [the 'Quarterly' reviewer's] metaphysics, especially about reason and his definition of it. I felt sure he was wrong, but having only

* 'Fortnightly Review,' 1869. With regard to the relations of Positivism to Science my father wrote to Mr. Spencer in 1875 : "How curious and amusing it is to see to what an extent the Positivists hate all men of science ; I fancy they are dimly conscious what laughable and gigantic blunders their prophet made in predicting the course of science."

common observation and sense to trust to, I did not know what to say in my second edition of my 'Descent.' Now a footnote and reference to you will do the work. . . . For me, this is one of the most *important* parts of the review. But for *pleasure*, I have been particularly glad that my few words* on the distinction, if it can be so called, between Mivart's two forms of morality, caught your attention. I am so pleased that you take the same view, and give authorities for it; but I searched Mill in vain on this head. How well you argue the whole case. I am mounting climax on climax; for after all there is nothing, I think, better in your whole review than your arguments *v.* Wallace on the intellect of savages. I must tell you what Hooker said to me a few years ago. "When I read Huxley, I feel quite infantile in intellect." By Jove I have felt the truth of this throughout your review. What a man you are. There are scores of splendid passages, and vivid flashes of wit. I have been a good deal more than merely pleased by the concluding part of your review; and all the more, as I own I felt mortified by the accusation of bigotry, arrogance, &c., in the 'Quarterly Review.' But I assure you, he may write his worst, and he will never mortify me again.

My dear Huxley, yours gratefully,

CHARLES DARWIN.

C. Darwin to F. Müller.

Haredene, Albury, August 2 [1871].

MY DEAR SIR,—Your last letter has interested me greatly; it is wonderfully rich in facts and original thoughts. First, let me say that I have been much pleased by what you say about my book. It has had a *very large* sale; but I have been much abused for it, especially for the chapter on the moral sense; and most of my reviewers consider the book as a poor affair. God knows what its merits may really be; all

* 'Descent of Man,' vol. i. p. 87. A discussion on the question whether an act done impulsively or instinctively can be called moral.

that I know is that I did my best. With familiarity I think naturalists will accept sexual selection to a greater extent than they now seem inclined to do. I should very much like to publish your letter, but I do not see how it could be made intelligible, without numerous coloured illustrations, but I will consult Mr. Wallace on this head. I earnestly hope that you keep notes of all your letters, and that some day you will publish a book: 'Notes of a Naturalist in S. Brazil,' or some such title. Wallace will hardly admit the possibility of sexual selection with Lepidoptera, and no doubt it is very improbable. Therefore, I am very glad to hear of your cases (which I will quote in the next edition) of the two sets of *Hesperiadæ*, which display their wings differently, according to which surface is coloured. I cannot believe that such display is accidental and purposeless. . . .

No fact of your letter has interested me more than that about mimicry. It is a capital fact about the males pursuing the wrong females. You put the difficulty of the first steps in imitation in a most striking and *convincing* manner. Your idea of sexual selection having aided protective imitation interests me greatly, for the same idea had occurred to me in quite different cases, viz. the dulness of all animals in the Galapagos Islands, Patagonia, &c., and in some other cases; but I was afraid even to hint at such an idea. Would you object to my giving some such sentence as follows: "F. Müller suspects that sexual selection may have come into play, in aid of protective imitation, in a very peculiar manner, which will appear extremely improbable to those who do not fully believe in sexual selection. It is that the appreciation of certain colour is developed in those species which frequently behold other species thus ornamented." Again let me thank you cordially for your most interesting letter. . . .

*C. Darwin to E. B. Tylor.**

Down [Sept. 24, 1871].

MY DEAR SIR,—I hope that you will allow me to have the pleasure of telling you how greatly I have been interested by your 'Primitive Culture,' now that I have finished it. It seems to me a most profound work, which will be certain to have permanent value, and to be referred to for years to come. It is wonderful how you trace animism from the lower races up to the religious belief of the highest races. It will make me for the future look at religion—a belief in the soul, &c.—from a new point of view. How curious, also, are the survivals or rudiments of old customs. . . . You will perhaps be surprised at my writing at so late a period, but I have had the book read aloud to me, and from much ill-health of late could only stand occasional short reads. The undertaking must have cost you gigantic labour. Nevertheless, I earnestly hope that you may be induced to treat morals in the same enlarged yet careful manner, as you have animism. I fancy from the last chapter that you have thought of this. No man could do the work so well as you, and the subject assuredly is a most important and interesting one. You must now possess references which would guide you to a sound estimation of the morals of savages; and how writers like Wallace, Lubbock, &c., &c., do differ on this head. Forgive me for troubling you, and believe me, with much respect,

Yours very sincerely,

CH. DARWIN.

1872.

[At the beginning of the year the sixth edition of the 'Origin,' which had been begun in June, 1871, was nearly completed. The last sheet was revised on January 10, 1872, and the book was published in the course of the month. This volume differs from the previous ones in appearance

* Keeper of the Museum, and Reader in Anthropology at Oxford.

and size—it consists of 458 pp. instead of 596 pp. and is a few ounces lighter; it is printed on bad paper, in small type, and with the lines unpleasantly close together. It had, however, one advantage over previous editions, namely that it was issued at a lower price. It is to be regretted that this the final edition of the 'Origin' should have appeared in so unattractive a form; a form which has doubtless kept off many readers from the book.

The discussion suggested by the 'Genesis of Species' was perhaps the most important addition to the book. The objection that incipient structures cannot be of use was dealt with in some detail, because it seemed to the author that this was the point in Mr. Mivart's book which has struck most readers in England.

It is a striking proof of how wide and general had become the acceptance of his views that my father found it necessary to insert (sixth edition, p. 424), the sentence: "As a record of a former state of things, I have retained in the foregoing paragraphs and also elsewhere, several sentences which imply that naturalists believe in the separate creation of each species; and I have been much censured for having thus expressed myself. But undoubtedly this was the general belief when the first edition of the present work appeared. . . Now things are wholly changed, and almost every naturalist admits the great principle of evolution."

A small correction introduced into this sixth edition is connected with one of his minor papers: "Note on the habits of the Pampas Woodpecker." * In the fifth edition of the 'Origin,' p. 220, he wrote:—

"Yet as I can assert not only from my own observation, but from that of the accurate Azara, it [the ground woodpecker] never climbs a tree." The paper in question was a reply to Mr. Hudson's remarks on the woodpecker in a previous number of the same journal. The last sentence of my father's paper is worth quoting for its temperate tone:

* Zoolog. Soc. Proc. 1870.

"Finally, I trust that Mr. Hudson is mistaken when he says that any one acquainted with the habits of this bird might be induced to believe that I 'had purposely wrested the truth' in order to prove my theory. He exonerates me from this charge; but I should be loath to think that there are many naturalists who, without any evidence, would accuse a fellow-worker of telling a deliberate falsehood to prove his theory." In the sixth edition, p. 142, the passage runs "in certain large districts it does not climb trees." And he goes on to give Mr. Hudson's statement that in other regions it does frequent trees.

One of the additions in the sixth edition (p. 149), was a reference to Mr. A. Hyatt's and Professor Cope's theory of "acceleration." With regard to this he wrote (October 10, 1872) in characteristic words to Mr. Hyatt:—

"Permit me to take this opportunity to express my sincere regret at having committed two grave errors in the last edition of my 'Origin of Species,' in my allusion to yours and Professor Cope's views on acceleration and retardation of development. I had thought that Professor Cope had preceded you; but I now well remember having formerly read with lively interest, and marked, a paper by you somewhere in my library, on fossil Cephalapods with remarks on the subject. It seems also that I have quite misrepresented your joint view. This has vexed me much. I confess that I have never been able to grasp fully what you wish to show, and I presume that this must be owing to some dulness on my part."

Lastly, it may be mentioned that this cheap edition being to some extent intended as a popular one, was made to include a glossary of technical terms, "given because several readers have complained. . . . that some of the terms used were unintelligible to them." The glossary was compiled by Mr. Dallas, and being an excellent collection of clear and sufficient definitions, must have proved useful to many readers.]

C. Darwin to J. L. A. de Quatrefages.

Down, January 15, 1872.

MY DEAR SIR,—I am much obliged for your very kind letter and exertions in my favour. I had thought that the publication of my last book ['Descent of Man'] would have destroyed all your sympathy with me, but though I estimated very highly your great liberality of mind, it seems that I underrated it.

I am gratified to hear that M. Lacaze-Duthiers will vote* for me, for I have long honoured his name. I cannot help regretting that you should expend your valuable time in trying to obtain for me the honour of election, for I fear, judging from the last time, that all your labour will be in vain. Whatever the result may be, I shall always retain the most lively recollection of your sympathy and kindness, and this will quite console me for my rejection.

With much respect and esteem, I remain, dear Sir,

Yours truly obliged,

CHARLES DARWIN.

P.S.—With respect to the great stress which you lay on man walking on two legs, whilst the quadrumana go on all fours, permit me to remind you that no one much values the great difference in the mode of locomotion, and consequently in structure, between seals and the terrestrial carnivora, or between the almost biped kangaroos and other marsupials.

C. Darwin to August Weismann.†

Down, April 5, 1872.

MY DEAR SIR,—I have now read your essay‡ with very great interest. Your view of the 'Origin' of local races

* He was not elected as a corresponding member of the French Academy until 1873.

† Professor of Zoology in Freiburg.

‡ 'Ueber den Einfluss der Isolirung auf die Artbildung.' Leipzig, 1872.

through "Amixie," is altogether new to me, and seems to throw an important light on an obscure problem. There is, however, something strange about the periods or endurance of variability. I formerly endeavoured to investigate the subject, not by looking to past time, but to species of the same genus widely distributed; and I found in many cases that all the species, with perhaps one or two exceptions, were variable. It would be a very interesting subject for a conchologist to investigate, viz., whether the species of the same genus were variable during many successive geological formations. I began to make inquiries on this head, but failed in this, as in so many other things, from the want of time and strength. In your remarks on crossing, you do not, as it seems to me, lay nearly stress enough on the increased vigour of the offspring derived from parents which have been exposed to different conditions. I have during the last five years been making experiments on this subject with plants, and have been astonished at the results, which have not yet been published.

In the first part of your essay, I thought that you wasted (to use an English expression) too much powder and shot on M. Wagner;* but I changed my opinion when I saw how admirably you treated the whole case, and how well you used the facts about the *Planorbis*. I wish I had studied this latter case more carefully. The manner in which, as you show, the different varieties blend together and make a constant whole, agrees perfectly with my hypothetical illustrations.

Many years ago the late E. Forbes described three closely consecutive beds in a secondary formation, each with representative forms of the same fresh-water shells: the case is evidently analogous with that of Hilgendorf,† but the inter-

* Prof. Wagner has written two essays on the same subject. 'Die Darwin'sche Theorie und das Migrationsgesetz, in 1868, and 'Ueber den Einfluss der Geographischen Isolirung, &c.,' an address to the Bavarian Academy of Sciences at Munich, 1870.

† "Ueber *Planorbis multiformis* im Steinheimer Süsswasser-kalk." Monatsbericht of the Berlin Academy, 1866.

esting connecting varieties or links were here absent. I rejoice to think that I formerly said as emphatically as I could, that neither isolation nor time by themselves do anything for the modification of species. Hardly anything in your essay has pleased me so much personally, as to find that you believe to a certain extent in sexual selection. As far as I can judge, very few naturalists believe in this. I may have erred on many points, and extended the doctrine too far, but I feel a strong conviction that sexual selection will hereafter be admitted to be a powerful agency. I cannot agree with what you say about the taste for beauty in animals not easily varying. It may be suspected that even the habit of viewing differently coloured surrounding objects would influence their taste, and Fritz Müller even goes so far as to believe that the sight of gaudy butterflies might influence the taste of distinct species. There are many remarks and statements in your essay which have interested me greatly, and I thank you for the pleasure which I have received from reading it.

With sincere respect, I remain,

My dear Sir, yours very faithfully,

CHARLES DARWIN.

P.S.—If you should ever be induced to consider the whole doctrine of sexual selection, I think that you will be led to the conclusion, that characters thus gained by one sex are very commonly transferred in a greater or less degree to the other sex.

[With regard to Moritz Wagner's first Essay, my father wrote to that naturalist, apparently in 1868:]

DEAR AND RESPECTED SIR,—I thank you sincerely for sending me your 'Migrationsgesetz, &c.,' and for the very kind and most honourable notice which you have taken of my works. That a naturalist who has travelled into so many and such distant regions, and who has studied animals of so many classes, should, to a considerable extent, agree with me, is, I

can assure you, the highest gratification of which I am capable. . . . Although I saw the effects of isolation in the case of islands and mountain-ranges, and knew of a few instances of rivers, yet the greater number of your facts were quite unknown to me. I now see that from the want of knowledge I did not make nearly sufficient use of the views which you advocate; and I almost wish I could believe in its importance to the same extent with you; for you well show, in a manner which never occurred to me, that it removes many difficulties and objections. But I must still believe that in many large areas all the individuals of the same species have been slowly modified, in the same manner, for instance, as the English race-horse has been improved, that is by the continued selection of the fleetest individuals, without any separation. But I admit that by this process two or more new species could hardly be found within the same limited area; some degree of separation, if not indispensable, would be highly advantageous; and here your facts and views will be of great value. . . .

[The following letter bears on the same subject. It refers to Professor M. Wagner's Essay, published in *Das Ausland*, May 31, 1875:]

C. Darwin to Moritz Wagner.

Down, October 13, 1876.

DEAR SIR,—I have now finished reading your essays, which have interested me in a very high degree, notwithstanding that I differ much from you on various points. For instance, several considerations make me doubt whether species are much more variable at one period than at another, except through the agency of changed conditions. I wish, however, that I could believe in this doctrine, as it removes many difficulties. But my strongest objection to your theory is that it does not explain the manifold adaptations in structure in every organic being—for instance in a *Picus* for climbing trees and catching insects—or in a *Strix* for catching

animals at night, and so on *ad infinitum*. No theory is in the least satisfactory to me unless it clearly explains such adaptations. I think that you misunderstand my views on isolation. I believe that all the individuals of a species can be slowly modified within the same district, in nearly the same manner as man effects by what I have called the process of unconscious selection. . . . I do not believe that one species will give birth to two or more new species as long as they are mingled together within the same district. Nevertheless I cannot doubt that many new species have been simultaneously developed within the same large continental area; and in my 'Origin of Species' I endeavoured to explain how two new species might be developed, although they met and intermingled on the *borders* of their range. It would have been a strange fact if I had overlooked the importance of isolation, seeing that it was such cases as that of the Galapagos Archipelago, which chiefly led me to study the origin of species. In my opinion the greatest error which I have committed, has been not allowing sufficient weight to the direct action of the environment, *i.e.* food, climate, &c., independently of natural selection. Modifications thus caused, which are neither of advantage nor disadvantage to the modified organism, would be especially favoured, as I can now see chiefly through your observations, by isolation in a small area, where only a few individuals lived under nearly uniform conditions.

When I wrote the 'Origin,' and for some years afterwards, I could find little good evidence of the direct action of the environment; now there is a large body of evidence, and your case of the *Saturnia* is one of the most remarkable of which I have heard. Although we differ so greatly, I hope that you will permit me to express my respect for your long-continued and successful labours in the good cause of natural science.

I remain, dear Sir, yours very faithfully,

CHARLES DARWIN.

[The two following letters are also of interest as bearing

on my father's views on the action of isolation as regards the origin of new species :]

C. Darwin to K. Semper.

Down, November 26, 1878.

MY DEAR PROFESSOR SEMPER,—When I published the sixth edition of the 'Origin,' I thought a good deal on the subject to which you refer, and the opinion therein expressed was my deliberate conviction. I went as far as I could, perhaps too far in agreement with Wagner; since that time I have seen no reason to change my mind, but then I must add that my attention has been absorbed on other subjects. There are two different classes of cases, as it appears to me, viz. those in which a species becomes slowly modified in the same country (of which I cannot doubt there are innumerable instances) and those cases in which a species splits into two or three or more new species, and in the latter case, I should think nearly perfect separation would greatly aid in their "specification," to coin a new word.

I am very glad that you are taking up this subject, for you will be sure to throw much light on it. I remember well, long ago, oscillating much; when I thought of the Fauna and Flora of the Galapagos Islands I was all for isolation, when I thought of S. America I doubted much. Pray believe me,

Yours very sincerely,

CH. DARWIN.

P.S.—I hope that this letter will not be quite illegible, but I have no amanuensis at present.

C. Darwin to K. Semper.

Down, November 30, 1878.

DEAR PROFESSOR SEMPER,—Since writing I have recalled some of the thoughts and conclusions which have passed through my mind of late years. In North America, in going from north to south or from east to west, it is clear that the changed conditions of life have modified the organisms in the

different regions, so that they now form distinct races or even species. It is further clear that in isolated districts, however small, the inhabitants almost always get slightly modified, and how far this is due to the nature of the slightly different conditions to which they are exposed, and how far to mere interbreeding, in the manner explained by Weismann, I can form no opinion. The same difficulty occurred to me (as shown in my 'Variation of Animals and Plants under Domestication') with respect to the aboriginal breeds of cattle, sheep, &c., in the separated districts of Great Britain, and indeed throughout Europe. As our knowledge advances, very slight differences, considered by systematists as of no importance in structure, are continually found to be functionally important; and I have been especially struck with this fact in the case of plants to which my observations have of late years been confined. Therefore it seems to me rather rash to consider the slight differences between representative species, for instance those inhabiting the different islands of the same archipelago, as of no functional importance, and as not in any way due to natural selection. With respect to all adapted structures, and these are innumerable, I cannot see how M. Wagner's view throws any light, nor indeed do I see at all more clearly than I did before, from the numerous cases which he has brought forward, how and why it is that a long isolated form should almost always become slightly modified. I do not know whether you will care about hearing my further opinion on the point in question, for as before remarked I have not attended much of late years to such questions, thinking it prudent, now that I am growing old, to work at easier subjects.

Believe me, yours very sincerely,

CH. DARWIN.

I hope and trust that you will throw light on these points.

P.S.—I will add another remark which I remember occurred to me when I first read M. Wagner. When a species

first arrives on a small island, it will probably increase rapidly, and unless all the individuals change instantaneously (which is improbable in the highest degree), the slowly, more or less, modifying offspring must intercross one with another, and with their unmodified parents, and any offspring not as yet modified. The case will then be like that of domesticated animals which have slowly become modified, either by the action of the external conditions or by the process which I have called the *unconscious selection* by man—*i.e.*, in contrast with methodical selection.

[The letters continue the history of the year 1872, which has been interrupted by a digression on Isolation.]

C. Darwin to the Marquis de Saporta.

Down, April 8, 1872.

DEAR SIR,—I thank you very sincerely and feel much honoured by the trouble which you have taken in giving me your reflections on the origin of Man. It gratifies me extremely that some parts of my work have interested you, and that we agree on the main conclusion of the derivation of man from some lower form.

I will reflect on what you have said, but I cannot at present give up my belief in the close relationship of Man to the higher Simiæ. I do not put much trust in any single character, even that of dentition; but I put the greatest faith in resemblances in many parts of the whole organisation, for I cannot believe that such resemblances can be due to any cause except close blood relationship. That man is closely allied to the higher Simiæ is shown by the classification of Linnæus, who was so good a judge of affinity. The man who in England knows most about the structure of the Simiæ, namely, Mr. Mivart, and who is bitterly opposed to my doctrines about the derivation of the mental powers, yet has publicly admitted that I have not put man too close to the higher Simiæ, as far as bodily structure is concerned. I do not think the absence of reversions of struct-

ure in man is of much weight; C. Vogt, indeed, argues that [the existence of] Micro-cephalous idiots is a case of reversion. No one who believes in Evolution will doubt that the Phocæ are descended from some terrestrial Carnivore. Yet no one would expect to meet with any such reversion in them. The lesser divergence of character in the races of man in comparison with the species of Simiadæ may perhaps be accounted for by man having spread over the world at a much later period than did the Simiadæ. I am fully prepared to admit the high antiquity of man; but then we have evidence, in the Dryopithecus, of the high antiquity of the Anthropomorphous Simiæ.

I am glad to hear that you are at work on your fossil plants, which of late years have afforded so rich a field for discovery. With my best thanks for your great kindness, and with much respect, I remain,

Dear Sir, yours very faithfully,

CHARLES DARWIN.

[In April, 1872, he was elected to the Royal Society of Holland, and wrote to Professor Donders :—

“Very many thanks for your letter. The honour of being elected a foreign member of your Royal Society has pleased me much. The sympathy of his fellow workers has always appeared to me by far the highest reward to which any scientific man can look. My gratification has been not a little increased by first hearing of the honour from you.”]

C. Darwin to Chauncey Wright.

Down, June 3, 1872.

MY DEAR SIR,—Many thanks for your article * in the ‘North American Review,’ which I have read with great

* The proof-sheets of an article which appeared in the July number of the ‘North American Review.’ It was a rejoinder to Mr. Mivart’s reply (‘N. Am. Review,’ April 1872) to Mr. Chauncey Wright’s pamphlet. Chauncey Wright says of it (‘Letters,’ p. 238) :—“It is not properly a rejoinder but a new article, repeating and expounding some of the points of my pamphlet, and answering some of Mr. Mivart’s replies incidentally.”

interest. Nothing can be clearer than the way in which you discuss the permanence or fixity of species. It never occurred to me to suppose that any one looked at the case as it seems Mr. Mivart does. Had I read his answer to you, perhaps I should have perceived this ; but I have resolved to waste no more time in reading reviews of my works or on Evolution, excepting when I hear that they are good and contain new matter. . . . It is pretty clear that Mr. Mivart has come to the end of his tether on this subject.

As your mind is so clear, and as you consider so carefully the meaning of words, I wish you would take some incidental occasion to consider when a thing may properly be said to be effected by the will of man. I have been led to the wish by reading an article by your Professor Whitney *versus* Schleicher. He argues, because each step of change in language is made by the will of man, the whole language so changes ; but I do not think that this is so, as man has no intention or wish to change the language. It is a parallel case with what I have called "unconscious selection," which depends on men consciously preserving the best individuals, and thus unconsciously altering the breed.

My dear Sir, yours sincerely,

CHARLES DARWIN.

[Not long afterwards (September) Mr. Chauncey Wright paid a visit to Down,* which he described in a letter † to Miss

* Mr. and Mrs. C. L. Brace, who had given much of their lives to philanthropic work in New York, also paid a visit at Down in this summer. Some of their work is recorded in Mr. Brace's 'The Dangerous Classes of New York,' and of this book my father wrote to the author :—

"Since you were here my wife has read aloud to me more than half of your work, and it has interested us both in the highest degree, and we shall read every word of the remainder. The facts seem to me very well told, and the inferences very striking. But after all this is but a weak part of the impression left on our minds by what we have read ; for we are both filled with earnest admiration at the heroic labours of yourself and others."

† 'Letters,' p. 246-248.

S. Sedgwick (now Mrs. William Darwin) : " If you can imagine me enthusiastic—absolutely and unqualifiedly so, without a *but* or criticism, then think of my last evening's and this morning's talks with Mr. Darwin. . . . I was never so worked up in my life, and did not sleep many hours under the hospitable roof. . . . It would be quite impossible to give by way of report any idea of these talks before and at and after dinner, at breakfast, and at leave-taking; and yet I dislike the egotism of 'testifying' like other religious enthusiasts, without any verification, or hint of similar experience."]

C. Darwin to Herbert Spencer.

Bassett, Southampton, June 10 [1872].

DEAR SPENCER,—I dare say you will think me a foolish fellow, but I cannot resist the wish to express my unbounded admiration of your article* in answer to Mr. Martineau. It is, indeed, admirable, and hardly less so your second article on Sociology (which, however, I have not yet finished) : I never believed in the reigning influence of great men on the world's progress; but if asked why I did not believe, I should have been sorely perplexed to have given a good answer. Every one with eyes to see and ears to hear (the number, I fear, are not many) ought to bow their knee to you, and I for one do.

Believe me, yours most sincerely,

C. DARWIN.

C. Darwin to J. D. Hooker.

Down, July 12 [1872].

MY DEAR HOOKER,—I must exhale and express my joy at the way in which the newspapers have taken up your case. I have seen the *Times*, the *Daily News*, and the *Pall Mall*, and hear that others have taken up the case.

The Memorial has done great good this way, whatever

* 'Mr. Martineau on Evolution,' by Herbert Spencer, 'Contemporary Review,' July 1872.

may be the result in the action of our wretched Government. On my soul, it is enough to make one turn into an old honest Tory. . . .

If you answer this, I shall be sorry that I have relieved my feelings by writing.

Yours affectionately,

C. DARWIN.

[The memorial here referred to was addressed to Mr. Gladstone, and was signed by a number of distinguished men, including Sir Charles Lyell, Mr. Bentham, Mr. Huxley, and Sir James Paget. It gives a complete account of the arbitrary and unjust treatment received by Sir J. D. Hooker at the hands of his official chief, the First Commissioner of Works. The document is published in full in 'Nature' (July 11, 1872), and is well worth studying as an example of the treatment which it is possible for science to receive from officialism. As 'Nature' observes, it is a paper which must be read with the greatest indignation by scientific men in every part of the world, and with shame by all Englishmen. The signatories of the memorial conclude by protesting against the expected consequences of Sir Joseph Hooker's persecution—namely his resignation, and the loss of "a man honoured for his integrity, beloved for his courtesy and kindness of heart; and who has spent in the public service not only a stainless but an illustrious life."

Happily this misfortune was averted, and Sir Joseph was freed from further molestation.]

C. Darwin to A. R. Wallace.

Down, August 3 [1872].

MY DEAR WALLACE,—I hate controversy, chiefly perhaps because I do it badly; but as Dr. Bree accuses you* of "blundering," I have thought myself bound to send the en-

* Mr. Wallace had reviewed Dr. Bree's book, 'An Exposition of Fallacies in the Hypothesis of Mr. Darwin,' in 'Nature,' July 25, 1872.

closed letter * to 'Nature,' that is if you in the least desire it. In this case please post it. If you do not *at all* wish it, I should rather prefer not sending it, and in this case please to tear it up. And I beg you to do the same, if you intend answering Dr. Bree yourself, as you will do it incomparably better than I should. Also please tear it up if you don't like the letter.

My dear Wallace, yours very sincerely,

CH. DARWIN.

C. Darwin to A. R. Wallace.

Down, August 28, 1872.

MY DEAR WALLACE,—I have at last finished the gigantic job of reading Dr. Bastian's book,† and have been deeply, interested by it. You wished to hear my impression, but it is not worth sending.

He seems to me an extremely able man, as, indeed, I thought when I read his first essay. His general argument in favour of Archebiosis‡ is wonderfully strong, though I cannot think much of some few of his arguments. The result is that I am bewildered and astonished by his statements, but am not convinced, though, on the whole, it seems to me probable that Archebiosis is true. I am not convinced, part-

* The letter is as follows :—"Bree on Darwinism." 'Nature,' Aug. 8, 1872. Permit me to state—though the statement is almost superfluous—that Mr. Wallace, in his review of Dr. Bree's work, gives with perfect correctness what I intended to express, and what I believe was expressed clearly, with respect to the probable position of man in the early part of his pedigree. As I have not seen Dr. Bree's recent work, and as his letter is unintelligible to me, I cannot even conjecture how he has so completely mistaken my meaning: but, perhaps, no one who has read Mr. Wallace's article, or who has read a work formerly published by Dr. Bree on the same subject as his recent one, will be surprised at any amount of misunderstanding on his part.—CHARLES DARWIN.

Aug. 3.

† 'The Beginnings of Life.' H. C. Bastian, 1872.

‡ That is to say, Spontaneous Generation. For the distinction between Archebiosis and Heterogenesis, see Bastian, chapter vi.

ly I think owing to the deductive cast of much of his reasoning; and I know not why, but I never feel convinced by deduction, even in the case of H. Spencer's writings. If Dr. Bastian's book had been turned upside down, and he had begun with the various cases of Heterogenesis, and then gone on to organic, and afterwards to saline solutions, and had then given his general arguments, I should have been, I believe, much more influenced. I suspect, however, that my chief difficulty is the effect of old convictions being stereotyped on my brain. I must have more evidence that germs, or the minutest fragments of the lowest forms, are always killed by 212° of Fahr. Perhaps the mere reiteration of the statements given by Dr. Bastian [by] other men, whose judgment I respect, and who have worked long on the lower organisms, would suffice to convince me. Here is a fine confession of intellectual weakness; but what an inexplicable frame of mind is that of belief!

As for Rotifers and Tardigrades being spontaneously generated, my mind can no more digest such statements, whether true or false, than my stomach can digest a lump of lead. Dr. Bastian is always comparing Archebiosis, as well as growth, to crystallisation; but, on this view, a Rotifer or Tardigrade is adapted to its humble conditions of life by a happy accident, and this I cannot believe. . . . He must have worked with very impure materials in some cases, as plenty of organisms appeared in a saline solution not containing an atom of nitrogen.

I wholly disagree with Dr. Bastian about many points in his latter chapters. Thus the frequency of generalised forms in the older strata seems to me clearly to indicate the common descent with divergence of more recent forms. Notwithstanding all his sneers, I do not strike my colours as yet about Pangenesis. I should like to live to see Archebiosis proved true, for it would be a discovery of transcendent importance; or, if false, I should like to see it disproved, and the facts otherwise explained; but I shall not live to see all this. If ever proved, Dr. Bastian will have taken a promi-

nent part in the work. How grand is the onward rush of science; it is enough to console us for the many errors which we have committed, and for our efforts being overlaid and forgotten in the mass of new facts and new views which are daily turning up.

This is all I have to say about Dr. Bastian's book, and it certainly has not been worth saying. . . .

C. Darwin to A. De Candolle.

Down, December 11, 1872.

MY DEAR SIR—I began reading your new book * sooner than I intended, and when I once began, I could not stop; and now you must allow me to thank you for the very great pleasure which it has given me. I have hardly ever read anything more original and interesting than your treatment of the causes which favour the development of scientific men. The whole was quite new to me, and most curious. When I began your essay I was afraid that you were going to attack the principle of inheritance in relation to mind, but I soon found myself fully content to follow you and accept your limitations. I have felt, of course, special interest in the latter part of your work, but there was here less novelty to me. In many parts you do me much honour, and everywhere more than justice. Authors generally like to hear what points most strike different readers, so I will mention that of your shorter essays, that on the future prevalence of languages, and on vaccination interested me the most, as, indeed, did that on statistics, and free will. Great liability to certain diseases, being probably liable to atavism, is quite a new idea to me. At p. 322 you suggest that a young swallow ought to be separated, and then let loose in order to test the power of instinct; but nature annually performs this experiment, as old cockoos migrate in England some weeks before the young birds of the same year. By the way, I have just used the forbidden word "nature," which, after reading

* 'Histoire des Sciences et des Savants,' 1873.

your essay, I almost determined never to use again. There are very few remarks in your book to which I demur, but when you back up Asa Gray in saying that all instincts are congenital habits, I must protest.

Finally, will you permit me to ask you a question: have you yourself, or some one who can be quite trusted, observed (p. 322) that the butterflies on the Alps are tamer than those on the lowlands? Do they belong to the same species? Has this fact been observed with more than one species? Are they brightly coloured kinds? I am especially curious about their alighting on the brightly coloured parts of ladies' dresses, more especially because I have been more than once assured that butterflies like bright colours, for instance, in India the scarlet leaves of *Pointsettia*.

Once again allow me to thank you for having sent me your work, and for the very unusual amount of pleasure which I have received in reading it.

With much respect, I remain, my dear Sir,

Yours very sincerely,

CHARLES DARWIN.

[The last revise of the 'Expression of the Emotions' was finished on August 22nd, 1872, and he wrote in his Diary:—"Has taken me about twelve months." As usual he had no belief in the possibility of the book being generally successful. The following passage in a letter to Haeckel gives the impression that he had felt the writing of this book as a somewhat severe strain:—

"I have finished my little book on 'Expression,' and when it is published in November I will of course send you a copy, in case you would like to read it for amusement. I have resumed some old botanical work, and perhaps I shall never again attempt to discuss theoretical views.

"I am growing old and weak, and no man can tell when his intellectual powers begin to fail. Long life and happiness to you for your own sake and for that of science."

It was published in the autumn. The edition consisted of 7000, and of these 5267 copies were sold at Mr. Murray's sale in November. Two thousand were printed at the end of the year, and this proved a misfortune, as they did not afterwards sell so rapidly, and thus a mass of notes collected by the author was never employed for a second edition during his lifetime.

Among the reviews of the 'Expression of the Emotions' may be mentioned the unfavourable notices in the *Athenæum*, Nov. 9, 1872, and the *Times*, Dec. 13, 1872. A good review by Mr. Wallace appeared in the 'Quarterly Journal of Science,' Jan. 1873. Mr. Wallace truly remarks that the book exhibits certain "characteristics of the author's mind in an eminent degree," namely, "the insatiable longing to discover the causes of the varied and complex phenomena presented by living things." He adds that in the case of the author "the restless curiosity of the child to know the 'what for?' the 'why?' and the 'how?' of everything" seems "never to have abated its force."

A writer in one of the theological reviews describes the book as the most "powerful and insidious" of all the author's works.

Professor Alexander Bain criticised the book in a post-script to the 'Senses and the Intellect;' to this essay the following letter refers :]

C. Darwin to Alexander Bain.

Down, October 9, 1873.

MY DEAR SIR,—I am particularly obliged to you for having sent me your essay. Your criticisms are all written in a quite fair spirit, and indeed no one who knows you or your works would expect anything else. What you say about the vagueness of what I have called the direct action of the nervous system, is perfectly just. I felt it so at the time, and even more of late. I confess that I have never been able fully to

grasp your principle of spontaneity,* as well as some other of your points, so as to apply them to special cases. But as we look at everything from different points of view, it is not likely that we should agree closely.

I have been greatly pleased by what you say about the crying expression and about blushing. Did you read a review in a late 'Edinburgh?' † It was magnificently contemptuous towards myself and many others.

I retain a very pleasant recollection of our sojourn together at that delightful place, Moor Park.

With my renewed thanks, I remain, my dear Sir,

Yours sincerely,

CH. DARWIN.

* Professor Bain expounded his theory of Spontaneity in the essay here alluded to. It would be impossible to do justice to it within the limits of a foot-note. The following quotations may give some notion of it:—

"By Spontaneity I understand the readiness to pass into movement in the absence of all stimulation whatever; the essential requisite being that the nerve-centres and muscles shall be fresh and vigorous. . . . The gesticulations and the carols of young and active animals are mere overflow of nervous energy; and although they are very apt to concur with pleasing emotion, they have an independent source. . . . They are not properly movements of expression; they express nothing at all except an abundant stock of physical power."

† The review on the 'Expression of the Emotions' appeared in the April number of the 'Edinburgh Review,' 1873. The opening sentence is a fair sample of the general tone of the article: "Mr. Darwin has added another volume of amusing stories and grotesque illustrations to the remarkable series of works already devoted to the exposition and defence of the evolutionary hypothesis." A few other quotations may be worth giving. "His one-sided devotion to an *a priori* scheme of interpretation seems thus steadily tending to impair the author's hitherto unrivalled powers as an observer. However this may be, most impartial critics will, we think, admit that there is a marked falling off both in philosophical tone and scientific interest in the works produced since Mr. Darwin committed himself to the crude metaphysical conception so largely associated with his name." The article is directed against Evolution as a whole, almost as much as against the doctrines of the book under discussion. We find throughout plenty of that effective style of criticism which consists in the

*C. Darwin to Mrs. Haliburton.**

Down, November 1 [1872].

MY DEAR MRS. HALIBURTON,—I dare say you will be surprised to hear from me. My object in writing now is to say that I have just published a book on the 'Expression of the Emotions in Man and Animals;' and it has occurred to me that you might possibly like to read some parts of it; and I can hardly think that this would have been the case with any of the books which I have already published. So I send by this post my present book. Although I have had no communication with you or the other members of your family for so long a time, no scenes in my whole life pass so frequently or so vividly before my mind as those which relate to happy old days spent at Woodhouse. I should very much like to hear a little news about yourself and the other members of your family, if you will take the trouble to write to me. Formerly I used to glean some news about you from my sisters.

I have had many years of bad health and have not been able to visit anywhere; and now I feel very old. As long as I pass a perfectly uniform life, I am able to do some daily work in Natural History, which is still my passion, as it was in old days, when you used to laugh at me for collecting beetles with such zeal at Woodhouse. Excepting from my continued ill-health, which has excluded me from society, my life has been a very happy one; the greatest drawback being

use of such expressions as "dogmatism," "intolerance," "presumptuous," "arrogant." Together with accusations of such various faults a "virtual abandonment of the inductive method," and the use of slang and vulgarisms.

The part of the article which seems to have interested my father is the discussion on the use which he ought to have made of painting and sculpture.

* Mrs. Haliburton was a daughter of my father's old friend, Mr. Owen of Woodhouse. Her husband, Judge Haliburton, was the well-known author of 'Sam Slick.'

that several of my children have inherited from me feeble health. I hope with all my heart that you retain, at least to a large extent, the famous "Owen constitution." With sincere feelings of gratitude and affection for all bearing the name of Owen, I venture to sign myself,

Yours affectionately,

CHARLES DARWIN.

C. Darwin to Mrs. Haliburton.

Down, November 6 [1872].

MY DEAR SARAH,—I have been very much pleased by your letter, which I must call charming. I hardly ventured to think that you would have retained a friendly recollection of me for so many years. Yet I ought to have felt assured that you would remain as warm-hearted and as true-hearted as you have ever been from my earliest recollection. I know well how many grievous sorrows you have gone through; but I am very sorry to hear that your health is not good. In the spring or summer, when the weather is better, if you can summon up courage to pay us a visit here, both my wife, as she desires me to say, and myself, would be truly glad to see you, and I know that you would not care about being rather dull here. It would be a real pleasure to me to see you.—Thank you much for telling about your family,—much of which was new to me. How kind you all were to me as a boy, and you especially, and how much happiness I owe to you. Believe me your affectionate and obliged friend,

CHARLES DARWIN.

P.S.—Perhaps you would like to see a photograph of me now that I am old.

1873.

[The only work (other than botanical) of this year was the preparation of a second edition of the 'Descent of Man,' the publication of which is referred to in the following chapter. This work was undertaken much against the grain, as he was

at the time deeply immersed in the manuscript of 'Insectivorous Plants.' Thus he wrote to Mr. Wallace (November 19), "I never in my lifetime regretted an interruption so much as this new edition of the 'Descent.'" And later (in December) he wrote to Mr. Huxley: "The new edition of the 'Descent' has turned out an awful job. It took me ten days merely to glance over letters and reviews with criticisms and new facts. It is a devil of a job."

The work was continued until April 1, 1874, when he was able to return to his much loved Drosera. He wrote to Mr. Murray:—

"I have at last finished, after above three months as hard work as I have ever had in my life, a corrected edition of the 'Descent,' and I much wish to have it printed off as soon as possible. As it is to be stereotyped I shall never touch it again."

The first of the miscellaneous letters of 1873 refers to a pleasant visit received from Colonel Higginson of Newport, U.S.]

C. Darwin to Thos. Wentworth Higginson.

Down, February 27th [1873].

MY DEAR SIR,—My wife has just finished reading aloud your 'Life with a Black Regiment,' and you must allow me to thank you heartily for the very great pleasure which it has in many ways given us. I always thought well of the negroes, from the little which I have seen of them; and I have been delighted to have my vague impressions confirmed, and their character and mental powers so ably discussed. When you were here I did not know of the noble position which you had filled. I had formerly read about the black regiments, but failed to connect your name with your admirable undertaking. Although we enjoyed greatly your visit to Down, my wife and myself have over and over again regretted that we did not know about the black regiment, as we should have greatly liked to have heard a little about the South from your own lips.

Your descriptions have vividly recalled walks taken forty

years ago in Brazil. We have your collected Essays, which were kindly sent us by Mr. [Moncure] Conway, but have not yet had time to read them. I occasionally glean a little news of you in the 'Index'; and within the last hour have read an interesting article of yours on the progress of Free Thought.

Believe me, my dear Sir, with sincere admiration,

Yours very faithfully,

CH. DARWIN.

[On May 28th he sent the following answers to the questions that Mr. Galton was at that time addressing to various scientific men, in the course of the inquiry which is given in his 'English Men of Science, their Nature and Nurture,' 1874. With regard to the questions, my father wrote, "I have filled up the answers as well as I could, but it is simply impossible for me to estimate the degrees." For the sake of convenience, the questions and answers relating to *Nurture* are made to precede those on *Nature*:

Education?	How taught?	I consider that all I have learnt of any value has been self-taught.
	Conducive to or restrictive of habits of observation?	Restrictive of observation, being almost entirely classical.
	Conducive to health or otherwise?	Yes.
	Peculiar merits?	None whatever.
	Chief omissions?	No mathematics or modern languages, nor any habits of observation or reasoning.
	Has the religious creed taught in your youth had any deterrent effect on the freedom of your researches?	No.
	Do your scientific tastes appear to have been innate?	Certainly innate.
	Were they determined by any and what events?	My innate taste for natural history strongly confirmed and directed by the voyage in the <i>Beagle</i> .

QUESTION.	YOURSELF.	YOUR FATHER.		
<i>Specify any interests that have been very actively pursued.</i>	Science, and field sports to a passionate degree during youth.			
<i>Religion?</i>	Nominally to Church of England.	Nominally to Church of England.		
<i>Politics?</i>	Liberal or Radical.	Liberal.		
<i>Health?</i>	Good when young—bad for last 33 years.	Good throughout life, except from gout.		
<i>Height, &c.?</i>	Height?	Height?	Figure, &c.?	
	6 ft.	Spare, whilst young rather stout.	6 ft. 2 in.	Very broad and corpulent.
	Colour of Hair?	Complexion?	Colour of Hair?	Complexion?
<i>Temperament?</i>	Brown.	Rather sallow.	Brown.	Ruddy.
	Somewhat nervous.		Sanguine.	
<i>Energy of body, &c.?</i>	Energy shown by much activity, and whilst I had health, power of resisting fatigue. I and one other man were alone able to fetch water for a large party of officers and sailors utterly prostrated. Some of my expeditions in S. America were adventurous. An early riser in the morning.			
	Great power of endurance although feeling much fatigue, as after consultations after long journeys; very active—not restless—very early riser, no travels. My father said his father suffered much from sense of fatigue, that he worked very hard.			

<i>Energy of mind, &c.?</i>	Shown by rigorous and long-continued work on same subject, as 20 years on the 'Origin of Species,' and 9 years on 'Cirripedia.'	Habitually very active mind—shown in conversation with a succession of people during the whole day.
<i>Memory?</i>	Memory very bad for dates, and for learning by rote; but good in retaining a general or vague recollection of many facts.	Wonderful memory for dates. In old age he told a person, reading aloud to him a book only read in youth, the passages which were coming—knew the birthdays and death, &c., of all friends and acquaintances.
<i>Studiosness?</i>	Very studious, but not large acquisitions.	Not very studious or mentally receptive, except for facts in conversation—great collector of anecdotes.
<i>Independence of Judgment?</i>	I think fairly independent; but I can give no instances. I gave up common religious belief almost independently from my own reflections.	Free thinker in religious matters. Liberal, with rather a tendency to Toryism.
<i>Originality or Eccentricity?</i>	—thinks this applies to me; I do not think so—i. e., as far as eccentricity. I suppose that I have shown originality in science, as I have made discoveries with regard to common objects.	Original character, had great personal influence and power of producing fear of himself in others. He kept his accounts with great care in a peculiar way, in a number of separate little books, without any general ledger.
<i>Special talents?</i>	None, except for business as evinced by keeping accounts, replies to correspondence, and investing money very well. Very methodical in all my habits.	Practical business—made a large fortune and incurred no losses.
<i>Strongly marked mental peculiarities, bearing on scientific success, and not specified above?</i>	Steadiness—great curiosity about facts and their meaning. Some love of the new and marvellous. N. B.—I find it quite impossible to estimate my character by your degrees.	Strong social affection and great sympathy in the pleasures of others. Sceptical as to new things. Curious as to facts. Great foresight. Not much public spirit—great generosity in giving money and assistance.

The following letter refers *inter alia* to a letter which appeared in 'Nature' (Sept. 25, 1873), "On the Males and Complementary Males of certain Cirripedes, and on Rudimentary Organs :"]

C. Darwin to E. Haeckel.

Down, September 25, 1873.

MY DEAR HÄCKEL,—I thank you for the present of your book,* and I am heartily glad to see its great success. You will do a wonderful amount of good in spreading the doctrine of Evolution, supporting it as you do by so many original observations. I have read the new preface with very great interest. The delay in the appearance of the English translation vexes and surprises me, for I have never been able to read it thoroughly in German, and I shall assuredly do so when it appears in English. Has the problem of the later stages of reduction of useless structures ever perplexed you? This problem has of late caused me much perplexity. I have just written a letter to 'Nature' with a hypothetical explanation of this difficulty, and I will send you the paper with the passage marked. I will at the same time send a paper which has interested me; it need not be returned. It contains a singular statement bearing on so-called Spontaneous Generation. I much wish that this latter question could be settled, but I see no prospect of it. If it could be proved true this would be most important to us. . . .

Wishing you every success in your admirable labours,

I remain, my dear Häckel, yours very sincerely,

CHARLES DARWIN.

* 'Schöpfungsgeschichte,' 4th ed. The translation ('The History of Creation') was not published until 1876.

CHAPTER VIII.

MISCELLANEA, INCLUDING SECOND EDITIONS OF 'CORAL REEFS,' THE 'DESCENT OF MAN,' AND THE 'VARIATIONS OF ANIMALS AND PLANTS.'

1874 AND 1875.

[THE year 1874 was given up to 'Insectivorous Plants,' with the exception of the months (see vol. ii, p. 353) devoted to the second edition of the 'Descent of Man,' and with the further exception of the time given to a second edition of his 'Coral Reefs' (1874). The Preface to the latter states that new facts have been added, the whole book revised, and "the latter chapters almost rewritten." In the Appendix some account is given of Professor Semper's objections, and this was the occasion of correspondence between that naturalist and my father. In Professor Semper's volume, 'Animal Life' (one of the International Series), the author calls attention to the subject in the following passage which I give in German, the published English translation being, as it seems to me, incorrect: "Es scheint mir als ob er in der zweiten Ausgabe seines allgemein bekannten Werks über Korallenriffe einem Irrthume über meine Beobachtungen zum Opfer gefallen ist, indem er die Angaben, die ich allerdings bisher immer nur sehr kurz gehalten hatte, vollständig falsch wiedergegeben hat."

The proof-sheets containing this passage were sent by Professor Semper to my father before 'Animal Life' was published, and this was the occasion for the following letter, which was afterwards published in Professor Semper's book.]

C. Darwin to K. Semper.

Down, October 2, 1879.

MY DEAR PROFESSOR SEMPER,—I thank you for your extremely kind letter of the 19th, and for the proof-sheets. I believe that I understand all, excepting one or two sentences, where my imperfect knowledge of German has interfered. This is my sole and poor excuse for the mistake which I made in the second edition of my 'Coral' book. Your account of the Pellew Islands is a fine addition to our knowledge on coral reefs. I have very little to say on the subject, even if I had formerly read your account and seen your maps, but had known nothing of the proofs of recent elevation, and of your belief that the islands have not since subsided. I have no doubt that I should have considered them as formed during subsidence. But I should have been much troubled in my mind by the sea not being so deep as it usually is round atolls, and by the reef on one side sloping so gradually beneath the sea; for this latter fact, as far as my memory serves me, is a very unusual and almost unparalleled case. I always foresaw that a bank at the proper depth beneath the surface would give rise to a reef which could not be distinguished from an atoll, formed during subsidence. I must still adhere to my opinion that the atolls and barrier reefs in the middle of the Pacific and Indian Oceans indicate subsidence; but I fully agree with you that such cases as that of the Pellew Islands, if of at all frequent occurrence, would make my general conclusions of very little value. Future observers must decide between us. It will be a strange fact if there has not been subsidence of the beds of the great oceans, and if this has not affected the forms of the coral reefs.

In the last three pages of the last sheet sent I am extremely glad to see that you are going to treat of the dispersion of animals. Your preliminary remarks seem to me quite excellent. There is nothing about M. Wagner, as I expected to

find. I suppose that you have seen Moseley's last book, which contains some good observations on dispersion.

I am glad that your book will appear in English, for then I can read it with ease. Pray believe me,

Yours very sincerely,

CHARLES DARWIN.

[The most recent criticism on the Coral-reef theory is by Mr. Murray, one of the staff of the *Challenger*, who read a paper before the Royal Society of Edinburgh, April 5, 1880.* The chief point brought forward is the possibility of the building up of submarine mountains, which may serve as foundations for coral reefs. Mr. Murray also seeks to prove that "the chief features of coral reefs and islands can be accounted for without calling in the aid of great and general subsidence." The following letter refers to this subject :]

C. Darwin to A. Agassiz.

Down, May 5, 1881.

. . . You will have seen Mr. Murray's views on the formation of atolls and barrier reefs. Before publishing my book, I thought long over the same view, but only as far as ordinary marine organisms are concerned, for at that time little was known of the multitude of minute oceanic organisms. I rejected this view, as from the few dredgings made in the *Beagle*, in the south temperate regions, I concluded that shells, the smaller corals, &c., decayed, and were dissolved, when not protected by the deposition of sediment, and sediment could not accumulate in the open ocean. Certainly, shells, &c., were in several cases completely rotten, and crumbled into mud between my fingers; but you will know well whether this is in any degree common. I have expressly said that a bank at the proper depth would give rise to an atoll, which could not be distinguished from one formed during subsidence. I can,

* An abstract is published in vol. x. of the 'Proceedings,' p. 505, and in 'Nature,' August 12, 1880.

however, hardly believe in the former presence of as many banks (there having been no subsidence) as there are atolls in the great oceans, within a reasonable depth, on which minute oceanic organisms could have accumulated to the thickness of many hundred feet. . . . Pray forgive me for troubling you at such length, but it has occurred [to me] that you might be disposed to give, after your wide experience, your judgment. If I am wrong, the sooner I am knocked on the head and annihilated so much the better. It still seems to me a marvellous thing that there should not have been much, and long continued, subsidence in the beds of the great oceans. I wish that some doubly rich millionaire would take it into his head to have borings made in some of the Pacific and Indian atolls, and bring home cores for slicing from a depth of 500 or 600 feet. . . .

[The second edition of the 'Descent of Man' was published in the autumn of 1874. Some severe remarks on the "monistic hypothesis" appeared in the July* number of the 'Quarterly Review' (p. 45). The Reviewer expresses his astonishment at the ignorance of certain elementary distinctions and principles (e. g. with regard to the *verbum mentale*) exhibited, among others, by Mr. Darwin, who does not exhibit the faintest indication of having grasped them, yet a clear perception of them, and a direct and detailed examination of his facts with regard to them, "was a *sine quâ non* for attempting, with a chance of success, the solution of the mystery as to the descent of man."

Some further criticisms of a later date may be here alluded to. In the 'Academy,' 1876 (pp. 562, 587), appeared a review of Mr. Mivart's 'Lessons from Nature,' by Mr. Wallace. When considering the part of Mr. Mivart's book relating to Natural and Sexual Selection, Mr. Wallace says: "In his violent attack on Mr. Darwin's theories our author uses unusually strong language. Not content with mere argument, he

* The review necessarily deals with the first edition of the 'Descent of Man.'

expresses 'reprobation of Mr. Darwin's views'; and asserts that though he (Mr. Darwin) has been obliged, virtually, to give up his theory, it is still maintained by Darwinians with 'unscrupulous audacity,' and the actual repudiation of it concealed by the 'conspiracy of silence.' Mr. Wallace goes on to show that these charges are without foundation, and points out that, "If there is one thing more than another for which Mr. Darwin is pre-eminent among modern literary and scientific men, it is for his perfect literary honesty, his self-abnegation in confessing himself wrong, and the eager haste with which he proclaims and even magnifies small errors in his works, for the most part discovered by himself."

The following extract from a letter to Mr. Wallace (June 17th) refers to Mr. Mivart's statement ('Lessons from Nature,' p. 144) that Mr. Darwin at first studiously disguised his views as to the "bestiality of man":—

"I have only just heard of and procured your two articles in the Academy. I thank you most cordially for your generous defence of me against Mr. Mivart. In the 'Origin' I did not discuss the derivation of any one species; but that I might not be accused of concealing my opinion, I went out of my way, and inserted a sentence which seemed to me (and still so seems) to disclose plainly my belief. This was quoted in my 'Descent of Man.' Therefore it is very unjust, . . . of Mr. Mivart to accuse me of base fraudulent concealment."

The letter which here follows is of interest in connection with the discussion, in the 'Descent of Man,' on the origin of the musical sense in man :]

*C. Darwin to E. Gurney.**

Down, July 8, 1876.

MY DEAR MR. GURNEY,—I have read your article† with much interest, except the latter part, which soared above my

* Author of 'The Power of Sound.'

† "Some disputed Points in Music."—'Fortnightly Review,' July, 1876.

ken. I am greatly pleased that you uphold my views to a certain extent. Your criticism of the rasping noise made by insects being necessarily rhythmical is very good; but though not made intentionally, it may be pleasing to the females from the nerve cells being nearly similar in function throughout the animal kingdom. With respect to your letter, I believe that I understand your meaning, and agree with you. I never supposed that the different degrees and kinds of pleasure derived from different music could be explained by the musical powers of our semi-human progenitors. Does not the fact that different people belonging to the same civilized nation are very differently affected by the same music, almost show that these diversities of taste and pleasure have been acquired during their individual lives? Your simile of architecture seems to me particularly good; for in this case the appreciation almost must be individual, though possibly the sense of sublimity excited by a grand cathedral, may have some connection with the vague feelings of terror and superstition in our savage ancestors, when they entered a great cavern or gloomy forest. I wish some one could analyse the feeling of sublimity. It amuses me to think how horrified some high flying æsthetic men will be at your encouraging such low degraded views as mine.

Believe me, yours very sincerely,

CHARLES DARWIN.

[The letters which follow are of a miscellaneous interest. The first extract (from a letter, Jan. 18, 1874) refers to a spiritualistic séance, held at Erasmus Darwin's house, 6 Queen Anne Street, under the auspices of a well-known medium:]

“ . . . We had grand fun, one afternoon, for George hired a medium, who made the chairs, a flute, a bell, and candlestick, and fiery points jump about in my brother's dining-room, in a manner that astounded every one, and took away all their breaths. It was in the dark, but George and Hens-

leigh Wedgwood held the medium's hands and feet on both sides all the time. I found it so hot and tiring that I went away before all these astounding miracles, or jugglery, took place. How the man could possibly do what was done passes my understanding. I came downstairs, and saw all the chairs, &c., on the table, which had been lifted over the heads of those sitting round it.

The Lord have mercy on us all, if we have to believe in such rubbish. F. Galton was there, and says it was a good séance. . . ."

The séance in question led to a smaller and more carefully organised one being undertaken, at which Mr. Huxley was present, and on which he reported to my father :]

C. Darwin to Professor T. H. Huxley.

Down, January 29 [1874].

MY DEAR HUXLEY,—It was very good of you to write so long an account. Though the séance did tire you so much it was, I think, really worth the exertion, as the same sort of things are done at all the séances, even at ——'s ; and now to my mind an enormous weight of evidence would be requisite to make one believe in anything beyond mere trickery. . . . I am pleased to think that I declared to all my family, the day before yesterday, that the more I thought of all that I had heard happened at Queen Anne St., the more convinced I was it was all imposture my theory was that [the medium] managed to get the two men on each side of him to hold each other's hands, instead of his, and that he was thus free to perform his antics. I am very glad that I issued my ukase to you to attend.

Yours affectionately,

CH. DARWIN.

[In the spring of this year (1874) he read a book which gave him great pleasure and of which he often spoke with admiration :—The 'Naturalist in Nicaragua,' by the late Thomas

Belt. Mr. Belt, whose untimely death may well be deplored by naturalists, was by profession an Engineer, so that all his admirable observations in Natural History in Nicaragua and elsewhere were the fruit of his leisure. The book is direct and vivid in style and is full of description and suggestive discussions. With reference to it my father wrote to Sir J. D. Hooker :—

“Belt I have read, and I am delighted that you like it so much, it appears to me the best of all natural history journals which have ever been published.”]

C. Darwin to the Marquis de Saporta.

Down, May 30, 1874.

DEAR SIR,—I have been very neglectful in not having sooner thanked you for your kindness in having sent me your ‘*Études sur la Végétation*,’ &c., and other memoirs. I have read several of them with very great interest, and nothing can be more important, in my opinion, than your evidence of the extremely slow and gradual manner in which specific forms change. I observe that M. A. De Candolle has lately quoted you on this head *versus* Heer. I hope that you may be able to throw light on the question whether such protean, or polymorphic forms, as those of *Rubus*, *Hieracium*, &c., at the present day, are those which generate new species; as for myself, I have always felt some doubt on this head. I trust that you may soon bring many of your countrymen to believe in Evolution, and my name will then perhaps cease to be scorned. With the most sincere respect, I remain, Dear Sir,

Yours faithfully,

CH. DARWIN.

C. Darwin to Asa Gray.

Down, June 5 [1874].

MY DEAR GRAY,—I have now read your article* in 'Nature,' and the last two paragraphs were not included in the slip sent before. I wrote yesterday and cannot remember exactly what I said, and now cannot be easy without again telling you how profoundly I have been gratified. Every one, I suppose, occasionally thinks that he has worked in vain, and when one of these fits overtakes me, I will think of your article, and if that does not dispel the evil spirit, I shall know that I am at the time a little bit insane, as we all are occasionally.

What you say about Teleology† pleases me especially, and I do not think any one else has ever noticed the point.‡ I have always said you were the man to hit the nail on the head.

Yours gratefully and affectionately,

CH. DARWIN.

[As a contribution to the history of the reception of the 'Origin of Species,' the meeting of the British Association in 1874, at Belfast, should be mentioned. It is memorable for Professor Tyndall's brilliant presidential address, in which a sketch of the history of Evolution is given culminating in an eloquent analysis of the 'Origin of Species,' and of the nature of its great success. With regard to Prof. Tyndall's address, Lyell wrote ('Life,' ii. p. 455) congratulating my father on the

* The article, "Charles Darwin," in the series of *Scientific Worthies* ('Nature,' June 4, 1874). This admirable estimate of my father's work in science is given in the form of a comparison and contrast between Robert Brown and Charles Darwin.

† "Let us recognise Darwin's great service to Natural Science in bringing back to it Teleology: so that instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology."

‡ See, however, Mr. Huxley's chapter on the 'Reception of the Origin of Species' in vol. i., p. 554.

meeting, "on which occasion you and your theory of Evolution may be fairly said to have had an ovation." In the same letter Sir Charles speaks of a paper* of Professor Judd's, and it is to this that the following letter refers:]

C. Darwin to C. Lyell.

Down, September 23, 1874.

MY DEAR LYELL,—I suppose that you have returned, or will soon return, to London; † and, I hope, reinvigorated by your outing. In your last letter you spoke of Mr. Judd's paper on the Volcanoes of the Hebrides. I have just finished it, and to ease my mind must express my extreme admiration.

It is years since I have read a purely geological paper which has interested me so greatly. I was all the more interested, as in the Cordillera I often speculated on the sources of the deluges of submarine porphyritic lavas, of which they are built; and, as I have stated, I saw to a certain extent the causes of the obliteration of the points of eruption. I was also not a little pleased to see my volcanic book quoted, for I thought it was completely dead and forgotten. What fine work will Mr. Judd assuredly do! . . . Now I have eased my mind; and so farewell, with both E. D.'s and C. D.'s very kind remembrances to Miss Lyell.

Yours affectionately,

CHARLES DARWIN.

[Sir Charles Lyell's reply to the above letter must have been one of the latest that my father received from his old friend, and it is with this letter that the volumes of his published correspondence closes.]

* On the Ancient Volcanoes of the Highlands, 'Journal of Geolog. Soc.,' 1874.

† Sir Charles Lyell returned from Scotland towards the end of September.

C. Darwin to Aug. Forel.

Down, October 15, 1874.

MY DEAR SIR,—I have now read the whole of your admirable work* and seldom in my life have I been more interested by any book. There are so many interesting facts and discussions, that I hardly know which to specify; but I think, firstly, the newest points to me have been about the size of the brain in the three sexes, together with your suggestion that increase of mind power may have led to the sterility of the workers. Secondly about the battles of the ants, and your curious account of the enraged ants being held by their comrades until they calmed down. Thirdly, the evidence of ants of the same community being the offspring of brothers and sisters. You admit, I think, that new communities will often be the product of a cross between not-related ants. Fritz Müller has made some interesting observations on this head with respect to Termites. The case of *Anergates* is most perplexing in many ways, but I have such faith in the law of occasional crossing that I believe an explanation will hereafter be found, such as the dimorphism of either sex and the occasional production of winged males. I see that you are puzzled how ants of the same community recognize each other; I once placed two (*F. rufa*) in a pill-box smelling strongly of asafœtida and after a day returned them to their homes; they were threatened, but at last recognized. I made the trial thinking that they might know each other by their odour; but this cannot have been the case, and I have often fancied that they must have some common signal. Your last chapter is one great mass of wonderful facts and suggestions, and the whole profoundly interesting. I have seldom been more gratified than by [your] honourable mention of my work.

I should like to tell you one little observation which I made with care many years ago; I saw ants (*Formica rufa*)

* 'Les Fourmis de la Suisse,' 4to, 1874.

carrying cocoons from a nest which was the largest I ever saw and which was well known to all the country people near, and an old man, apparently about eighty years of age, told me that he had known it ever since he was a boy. The ants carrying the cocoons did not appear to be emigrating; following the line, I saw many ascending a tall fir tree still carrying their cocoons. But when I looked closely I found that all the cocoons were empty cases. This astonished me, and next day I got a man to observe with me, and we again saw ants bringing empty cocoons out of the nest; each of us fixed on one ant and slowly followed it, and repeated the observation on many others. We thus found that some ants soon dropped their empty cocoons; others carried them for many yards, as much as thirty paces, and others carried them high up the fir tree out of sight. Now here I think we have one instinct in contest with another and mistaken one. The first instinct being to carry the empty cocoons out of the nest, and it would have been sufficient to have laid them on the heap of rubbish, as the first breath of wind would have blown them away. And then came in the contest with the other very powerful instinct of preserving and carrying their cocoons as long as possible; and this they could not help doing although the cocoons were empty. According as the one or other instinct was the stronger in each individual ant, so did it carry the empty cocoon to a greater or less distance. If this little observation should ever prove of any use to you, you are quite at liberty to use it. Again thanking you cordially for the great pleasure which your work has given me, I remain with much respect,

Yours sincerely,

CH. DARWIN.

P.S.—If you read English easily I should like to send you Mr. Belt's book, as I think you would like it as much as did Fritz Müller.

C. Darwin to J. Fiske.

Down, December 8, 1874.

MY DEAR SIR,—You must allow me to thank you for the very great interest with which I have at last slowly read the whole of your work.* I have long wished to know something about the views of the many great men whose doctrines you give. With the exception of special points I did not even understand H. Spencer's general doctrine; for his style is too hard work for me. I never in my life read so lucid an expositor (and therefore thinker) as you are; and I think that I understand nearly the whole—perhaps less clearly about Cosmic Theism and Causation than other parts. It is hopeless to attempt out of so much to specify what has interested me most, and probably you would not care to hear. I wish some chemist would attempt to ascertain the result of the cooling of heated gases of the proper kinds, in relation to your hypothesis of the origin of living matter. It pleased me to find that here and there I had arrived from my own crude thoughts at some of the same conclusions with you; though I could seldom or never have given my reasons for such conclusions. I find that my mind is so fixed by the inductive method, that I cannot appreciate deductive reasoning: I must begin with a good body of facts and not from a principle (in which I always suspect some fallacy) and then as much deduction as you please. This may be very narrow-minded; but the result is that such parts of H. Spencer, as I have read with care impress my mind with the idea of his inexhaustible wealth of suggestion, but never convince me; and so I find it with some others. I believe the cause to lie in the frequency with which I have found first-formed theories [to be] erroneous. I thank you for the honourable mention which you make of my works. Parts of the 'Descent of Man' must have appeared laughably weak to you: nevertheless, I have sent you a new edition just published. Thank-

* 'Outlines of Cosmic Philosophy,' 2 vols. 8vo. 1874.

ing you for the profound interest and profit with which I have read your work. I remain,

My dear Sir, yours very faithfully,

CH. DARWIN.

1875.

[The only work, not purely botanical, which occupied my father in the present year was the correction of the second edition of 'The Variation of Animals and Plants,' and on this he was engaged from the beginning of July till October 3rd. The rest of the year was taken up with his work on insectivorous plants, and on cross-fertilisation, as will be shown in a later chapter. The chief alterations in the second edition of 'Animals and Plants' are in the eleventh chapter on "Bud-variation and on certain anomalous modes of reproduction;" the chapter on Pangenesis "was also largely altered and remodelled." He mentions briefly some of the authors who have noticed the doctrine. Professor Delpino's 'Sulla Darwiniana Teoria della Pangenesi' (1869), an adverse but fair criticism, seems to have impressed him as valuable. Of another critique my father characteristically says,* "Dr. Lionel Beale ('Nature,' May 11, 1871, p. 26) sneers at the whole doctrine with much acerbity and some justice." He also points out that, in Mantegazza's 'Elementi di Igiene,' the theory of Pangenesis was clearly foreseen.

In connection with this subject, a letter of my father's to 'Nature' (April 27, 1871) should be mentioned. A paper by Mr. Galton had been read before the Royal Society (March 30, 1871) in which were described experiments, on intertransfusion of blood, designed to test the truth of the hypothesis of pangenesis. My father, while giving all due credit to Mr. Galton for his ingenious experiments, does not allow that pangenesis has "as yet received its death-blow, though from presenting so many vulnerable points its life is always in jeopardy."

* 'Animals and Plants,' 2nd edit. vol. ii. p. 350.

He seems to have found the work of correcting very wearisome, for he wrote :—

“I have no news about myself, as I am merely slaving over the sickening work of preparing new editions. I wish I could get a touch of poor Lyell’s feelings, that it was delightful to improve a sentence, like a painter improving a picture.”

The feeling of effort or strain over this piece of work, is shown in a letter to Professor Haeckel :—

“What I shall do in future if I live, Heaven only knows ; I ought perhaps to avoid general and large subjects, as too difficult for me with my advancing years, and I suppose enfeebled brain.”

At the end of March, in this year, the portrait for which he was sitting to Mr. Oules^s was finished. He felt the sittings a great fatigue, in spite of Mr. Oules^s’ considerate desire to spare him as far as was possible. In a letter to Sir J. D. Hooker he wrote, “I look a very venerable, acute, melancholy old dog ; whether I really look so I do not know.” The picture is in the possession of the family, and is known to many through M. Rajon’s etching. Mr. Oules^s’ portrait is, in my opinion, the finest representation of my father that has been produced.

The following letter refers to the death of Sir Charles Lyell, which took place on February 22nd, 1875, in his seventy-eighth year.]

*C. Darwin to Miss Buckley (now Mrs. Fisher).**

Down, February 23, 1875.

MY DEAR MISS BUCKLEY,—I am grieved to hear of the death of my old and kind friend, though I knew that it could not be long delayed, and that it was a happy thing that his life should not have been prolonged, as I suppose that his mind would inevitably have suffered. I am glad that Lady

* Mrs. Fisher acted as Secretary to Sir Charles Lyell.

Lyell* has been saved this terrible blow. His death makes me think of the time when I first saw him, and how full of sympathy and interest he was about what I could tell him of coral reefs and South America. I think that this sympathy with the work of every other naturalist was one of the finest features of his character. How completely he revolutionised Geology: for I can remember something of pre-Lyellian days.

I never forget that almost everything which I have done in science I owe to the study of his great works. Well, he has had a grand and happy career, and no one ever worked with a truer zeal in a noble cause. It seems strange to me that I shall never again sit with him and Lady Lyell at their breakfast. I am very much obliged to you for having so kindly written to me.

Pray give our kindest remembrances to Miss Lyell, and I hope that she has not suffered much in health, from fatigue and anxiety.

Believe me, my dear Miss Buckley,

Yours very sincerely,

CHARLES DARWIN.

C. Darwin to J. D. Hooker.

Down, February 25 [1875].

MY DEAR HOOKER,—Your letter so full of feeling has interested me greatly. I cannot say that I felt his [Lyell's] death much, for I fully expected it, and have looked for some little time at his career as finished.

I dreaded nothing so much as his surviving with impaired mental powers. He was, indeed, a noble man in very many ways; perhaps in none more than in his warm sympathy with the work of others. How vividly I can recall my first conversation with him, and how he astonished me by his interest in what I told him. How grand also was his candour and

* Lady Lyell died in 1873.

pure love of truth. Well, he is gone, and I feel as if we were all soon to go. . . . I am deeply rejoiced about Westminster Abbey,* the possibility of which had not occurred to me when I wrote before. I did think that his works were the most enduring of all testimonials (as you say) to him; but then I did not like the idea of his passing away with no outward sign of what scientific men thought of his merits. Now all this is changed, and nothing can be better than Westminster Abbey. Mrs. Lyell has asked me to be one of the pall-bearers, but I have written to say that I dared not, as I should so likely fail in the midst of the ceremony, and have my head whirling off my shoulders. All this affair must have cost you much fatigue and worry, and how I do wish you were out of England. . . .

[In 1881 he wrote to Mrs. Fisher in reference to her article on Sir Charles Lyell in the 'Encyclopædia Britannica':—

"For such a publication I suppose you do not want to say much about his private character, otherwise his strong sense of humour and love of society might have been added. Also his extreme interest in the progress of the world, and in the happiness of mankind. Also his freedom from all religious bigotry, though these perhaps would be a superfluity."

The following refers to the Zoological station at Naples, a subject on which my father felt an enthusiastic interest :]

C. Darwin to Anton Dohrn.

Down [1875 ?].

MY DEAR DR. DOHRN,—Many thanks for your most kind letter, I most heartily rejoice at your improved health and at the success of your grand undertaking, which will have so much influence on the progress of Zoology throughout Europe.

If we look to England alone, what capital work has already been done at the Station by Balfour and Ray Lankester. . . .

* Sir C. Lyell was buried in Westminster Abbey.

When you come to England, I suppose that you will bring Mrs. Dohrn, and we shall be delighted to see you both here. I have often boasted that I have had a live Uhlan in my house! It will be very interesting to me to read your new views on the ancestry of the Vertebrates. I shall be sorry to give up the Ascidians, to whom I feel profound gratitude; but the great thing, as it appears to me, is that any link whatever should be found between the main divisions of the Animal Kingdom. . . .

C. Darwin to August Weismann.

Down, December 6, 1875.

MY DEAR SIR,—I have been profoundly interested by your essay on *Amblystoma*,* and think that you have removed a great stumbling-block in the way of Evolution. I once thought of reversion in this case; but in a crude and imperfect manner. I write now to call your attention to the sterility of moths when hatched out of their proper season; I give references in chapter 18 of my 'Variation under Domestication' (vol. ii. p. 157, of English edition), and these cases illustrate, I think, the sterility of *Amblystoma*. Would it not be worth while to examine the reproductive organs of those individuals of *wingless* Hemiptera which occasionally have wings, as in the case of the bed-bug. I think I have heard that the females of *Mutilla* sometimes have wings. These cases must be due to reversion. I dare say many anomalous cases will be hereafter explained on the same principle.

I hinted at this explanation in the extraordinary case of the black-shouldered peacock, the so-called *Pavo nigripennis* given in my 'Var. under Domest. ;' and I might have been bolder, as the variety is in many respects intermediate between the two known species. .

With much respect,

Yours sincerely,

CH. DARWIN.

* 'Umwandlung des Axolotl.'

THE VIVISECTION QUESTION.

[It was in November 1875 that my father gave his evidence before the Royal Commission on Vivisection.* I have, therefore, placed together here the matter relating to this subject, irrespective of date. Something has already been said of my father's strong feeling with regard to suffering both in man and beast. It was indeed one of the strongest feelings in his nature, and was exemplified in matters small and great, in his sympathy with the educational miseries of dancing dogs, or in his horror at the sufferings of slaves.†

The remembrance of screams, or other sounds heard in Brazil, when he was powerless to interfere with what he believed to be the torture of a slave, haunted him for years, especially at night. In smaller matters, where he could interfere, he did so vigorously. He returned one day from his walk pale and faint from having seen a horse ill-used, and from the agitation of violently remonstrating with the man. On another occasion he saw a horse-breaker teaching his son to ride, the little boy was frightened and the man was rough; my father stopped, and jumping out of the carriage reproved the man in no measured terms.

One other little incident may be mentioned, showing that his humanity to animals was well known in his own neighbourhood. A visitor, driving from Orpington to Down, told

* See vol. i. p. 118.

† He once made an attempt to free a patient in a mad-house, who (as he wrongly supposed) was sane. He had some correspondence with the gardener at the asylum, and on one occasion he found a letter from a patient enclosed with one from the gardener. The letter was rational in tone and declared that the writer was sane and wrongfully confined.

My father wrote to the Lunacy Commissioners (without explaining the source of his information) and in due time heard that the man had been visited by the Commissioners, and that he was certainly insane. Some time afterwards the patient was discharged, and wrote to thank my father for his interference, adding that he had undoubtedly been insane, when he wrote his former letter.

the man to go faster, "Why," said the driver, "If I had whipped the horse *this* much, driving Mr. Darwin, he would have got out of the carriage and abused me well."

With respect to the special point under consideration,—the sufferings of animals subjected to experiment,—nothing could show a stronger feeling than the following extract from a letter to Professor Ray Lankester (March 22, 1871):—

"You ask about my opinion on vivisection. I quite agree that it is justifiable for real investigations on physiology; but not for mere damnable and detestable curiosity. It is a subject which makes me sick with horror, so I will not say another word about it, else I shall not sleep to-night."

An extract from Sir Thomas Farrer's notes shows how strongly he expressed himself in a similar manner in conversation:—

"The last time I had any conversation with him was at my house in Bryanston Square, just before one of his last seizures. He was then deeply interested in the vivisection question; and what he said made a deep impression on me. He was a man eminently fond of animals and tender to them; he would not knowingly have inflicted pain on a living creature; but he entertained the strongest opinion that to prohibit experiments on living animals, would be to put a stop to the knowledge of and the remedies for pain and disease."

The Anti-Vivisection agitation, to which the following letters refer, seems to have become specially active in 1874, as may be seen, e.g. by the index to 'Nature' for that year, in which the word "Vivisection," suddenly comes into prominence. But before that date the subject had received the earnest attention of biologists. Thus at the Liverpool Meeting of the British Association in 1870, a Committee was appointed, which reported, defining the circumstances and conditions under which, in the opinion of the signatories, experiments on living animals were justifiable. In the spring of 1875, Lord Hartismere introduced a Bill into the Upper House to regulate the course of physiological research. Shortly afterwards a Bill more just towards science in its provisions

was introduced to the House of Commons by Messrs. Lyon Playfair, Walpole, and Ashley. It was however, withdrawn on the appointment of a Royal Commission to inquire into the whole question. The Commissioners were Lords Cardwell and Winmarleigh, Mr. W. E. Forster, Sir J. B. Karslake, Mr. Huxley, Professor Erichssen, and Mr. R. H. Hutton: they commenced their inquiry in July, 1875, and the Report was published early in the following year.

In the early summer of 1876, Lord Carnarvon's Bill, entitled, "An Act to amend the Law relating to Cruelty to Animals," was introduced. It cannot be denied that the framers of this Bill, yielding to the unreasonable clamour of the public, went far beyond the recommendations of the Royal Commission. As a correspondent in 'Nature' put it (1876, p. 248), "the evidence on the strength of which legislation was recommended went beyond the facts, the Report went beyond the evidence, the Recommendations beyond the Report; and the Bill can hardly be said to have gone beyond the Recommendations; but rather to have contradicted them."

The legislation which my father worked for, as described in the following letters, was practically what was introduced as Dr. Lyon Playfair's Bill.]

*C. Darwin to Mrs. Litchfield.**

January 4, 1875.

MY DEAR H.—Your letter has led me to think over vivisection (I wish some new word like anæ-section could be invented †) for some hours, and I will jot down my conclusions, which will appear very unsatisfactory to you. I have long thought physiology one of the greatest of sciences, sure sooner,

* His daughter.

† He communicated to 'Nature' (Sep. 30, 1880) an article by Dr. Wilder, of Cornell University, an abstract of which was published (p. 517). Dr. Wilder advocated the use of the word 'Callisection' for painless operations on animals.

or more probably later, greatly to benefit mankind ; but, judging from all other sciences, the benefits will accrue only indirectly in the search for abstract truth. It is certain that physiology can progress only by experiments on living animals. Therefore the proposal to limit research to points of which we can now see the bearings in regard to health, &c., I look at as puerile. I thought at first it would be good to limit vivisection to public laboratories ; but I have heard only of those in London and Cambridge, and I think Oxford ; but probably there may be a few others. Therefore only men living in a few great towns would carry on investigation, and this I should consider a great evil. If private men were permitted to work in their own houses, and required a licence, I do not see who is to determine whether any particular man should receive one. It is young unknown men who are the most likely to do good work. I would gladly punish severely any one who operated on an animal not rendered insensible, if the experiment made this possible ; but here again I do not see that a magistrate or jury could possibly determine such a point. Therefore I conclude, if (as is likely) some experiments have been tried too often, or anæsthetics have not been used when they could have been, the cure must be in the improvement of humanitarian feelings. Under this point of view I have rejoiced at the present agitation. If stringent laws are passed, and this is likely, seeing how unscientific the House of Commons is, and that the gentlemen of England are humane, as long as their sports are not considered, which entailed a hundred or thousand-fold more suffering than the experiments of physiologists—if such laws are passed, the result will assuredly be that physiology, which has been until within the last few years at a standstill in England, will languish or quite cease. It will then be carried on solely on the Continent ; and there will be so many the fewer workers on this grand subject, and this I should greatly regret. By the way, F. Balfour, who has worked for two or three years in the laboratory at Cambridge, declares to George that he has never seen an experiment, except with animals rendered insensible.

No doubt the names of Doctors will have great weight with the House of Commons ; but very many practitioners neither know nor care anything about the progress of knowledge. I cannot at present see my way to sign any petition, without hearing what physiologists thought would be its effect, and then judging for myself. I certainly could not sign the paper sent me by Miss Cobbe, with its monstrous (as it seems to me) attack on Virchow for experimenting on the *Trichinæ*. I am tired and so no more.

Yours affectionately,
CHARLES DARWIN.

C. Darwin to J. D. Hooker.

Down, April 14 [1875].

MY DEAR HOOKER,—I worked all the time in London on the vivisection question ; and we now think it advisable to go further than a mere petition. Litchfield* drew up a sketch of a Bill, the essential features of which have been approved by Sanderson, Simon and Huxley, and from conversation, will, I believe, be approved by Paget, and almost certainly, I think, by Michael Foster. Sanderson, Simon and Paget wish me to see Lord Derby, and endeavour to gain his advocacy with the Home Secretary. Now, if this is carried into effect, it will be of great importance to me to be able to say that the Bill in its essential features has the approval of some half-dozen eminent scientific men. I have therefore asked Litchfield to enclose a copy to you in its first rough form ; and if it is not essentially modified may I say that it meets with your approval as President of the Royal Society ? The object is to protect animals, and at the same time not to injure Physiology, and Huxley and Sanderson's approval almost suffices on this head. Pray let me have a line from you soon.

Yours affectionately,
CHARLES DARWIN.

* Mr. R. B. Litchfield, his son-in-law.

[The Physiological Society, which was founded in 1876, was in some measure the outcome of the anti-vivisection movement, since it was this agitation which impressed on Physiologists the need of a centre for those engaged in this particular branch of science. With respect to the Society, my father wrote to Mr. Romanes (May 29, 1876):—

“I was very much gratified by the wholly unexpected honour of being elected one of the Honorary Members. This mark of sympathy has pleased me to a very high degree.”

The following letter appeared in the *Times*, April 18th, 1881 :]

*C. Darwin to Frithiof Holmgren.**

Down, April 14, 1881.

DEAR SIR,—In answer to your courteous letter of April 7, I have no objection to express my opinion with respect to the right of experimenting on living animals. I use this latter expression as more correct and comprehensive than that of vivisection. You are at liberty to make any use of this letter which you may think fit, but if published I should wish the whole to appear. I have all my life been a strong advocate for humanity to animals, and have done what I could in my writings to enforce this duty. Several years ago, when the agitation against physiologists commenced in England, it was asserted that inhumanity was here practised, and useless suffering caused to animals; and I was led to think that it might be advisable to have an Act of Parliament on the subject. I then took an active part in trying to get a Bill passed, such as would have removed all just cause of complaint, and at the same time have left physiologists free to pursue their researches,—a Bill very different from the Act which has since been passed. It is right to add that the investigation of the matter by a Royal Commission proved that the accusations made against our English physiologists

* Professor of Physiology at Upsala.

were false. From all that I have heard, however, I fear that in some parts of Europe little regard is paid to the sufferings of animals, and if this be the case, I should be glad to hear of legislation against inhumanity in any such country. On the other hand, I know that physiology cannot possibly progress except by means of experiments on living animals, and I feel the deepest conviction that he who retards the progress of physiology commits a crime against mankind. Any one who remembers, as I can, the state of this science half a century ago, must admit that it has made immense progress, and it is now progressing at an ever-increasing rate. What improvements in medical practice may be directly attributed to physiological research is a question which can be properly discussed only by those physiologists and medical practitioners who have studied the history of their subjects; but, as far as I can learn, the benefits are already great. However this may be, no one, unless he is grossly ignorant of what science has done for mankind, can entertain any doubt of the incalculable benefits which will hereafter be derived from physiology, not only by man, but by the lower animals. Look for instance at Pasteur's results in modifying the germs of the most malignant diseases, from which, as it so happens, animals will in the first place receive more relief than man. Let it be remembered how many lives and what a fearful amount of suffering have been saved by the knowledge gained of parasitic worms through the experiments of Virchow and others on living animals. In the future every one will be astonished at the ingratitude shown, at least in England, to these benefactors of mankind. As for myself, permit me to assure you that I honour, and shall always honour, every one who advances the noble science of physiology.

Dear Sir, yours faithfully,

CHARLES DARWIN.

[In the *Times* of the following day appeared a letter headed "Mr. Darwin and Vivisection," signed by Miss Frances Power Cobbe. To this my father replied in the

Times of April 22, 1881. On the same day he wrote to Mr. Romanes :—

“As I have a fair opportunity, I sent a letter to the *Times* on Vivisection, which is printed to-day. I thought it fair to bear my share of the abuse poured in so atrocious a manner on all physiologists.”]

C. Darwin to the Editor of the Times.

SIR,—I do not wish to discuss the views expressed by Miss Cobbe in the letter which appeared in the *Times* of the 19th inst. ; but as she asserts that I have “misinformed” my correspondent in Sweden in saying that “the investigation of the matter by a Royal Commission proved that the accusations made against our English physiologists were false,” I will merely ask leave to refer to some other sentences from the Report of the Commission.

(1.) The sentence—“It is not to be doubted that inhumanity may be found in persons of very high position as physiologists,” which Miss Cobbe quotes from page 17 of the report, and which, in her opinion, “can necessarily concern English physiologists alone and not foreigners,” is immediately followed by the words “We have seen that it was so in Magendie.” Magendie was a French physiologist who became notorious some half century ago for his cruel experiments on living animals.

(2). The Commissioners, after speaking of the “general sentiment of humanity” prevailing in this country, say (p. 10) :—

“This principle is accepted generally by the very highly educated men whose lives are devoted either to scientific investigation and education or to the mitigation or the removal of the sufferings of their fellow-creatures ; though differences of degree in regard to its practical application will be easily discernible by those who study the evidence as it has been laid before us.”

Again, according to the Commissioners (p. 10) :—

"The secretary of the Royal Society for the Prevention of Cruelty to Animals, when asked whether the general tendency of the scientific world in this country is at variance with humanity, says he believes it to be very different, indeed, from that of foreign physiologists; and while giving it as the opinion of the society that experiments are performed which are in their nature beyond any legitimate province of science, and that the pain which they inflict is pain which it is not justifiable to inflict even for the scientific object in view, he readily acknowledges that he does not know a single case of wanton cruelty, and that in general the English physiologists have used anæsthetics where they think they can do so with safety to the experiment."

I am, Sir, your obedient servant,

CHARLES DARWIN.

April 21.

[In the *Times* of Saturday, April 23, 1881, appeared a letter from Miss Cobbe in reply:]

C. Darwin to G. J. Romanes.

Down, April 25, 1881.

MY DEAR ROMANES,—I was very glad to read your last note with much news interesting to me. But I write now to say how I, and indeed all of us in the house have admired your letter in the *Times*.* It was so simple and direct. I was particularly glad about Burton Sanderson, of whom I have been for several years a great admirer. I was also especially glad to read the last sentences. I have been bothered with several letters, but none abusive. Under a *selfish* point of view I am very glad of the publication of your letter, as I was at first inclined to think that I had done mischief by stirring up the mud. Now I feel sure that I have done good. Mr. Jesse has written to me very politely, he says his Society has had nothing to do with placards and diagrams against

* April 25, 1881.—Mr. Romanes defended Dr. Sanderson against the accusations made by Miss Cobbe.

physiology, and I suppose, therefore, that these all originate with Miss Cobbe. . . . Mr. Jesse complains bitterly that the *Times* will "burke" all his letters to this newspaper, nor am I surprised, judging from the laughable tirades advertised in *Nature*.

Ever yours, very sincerely,

CH. DARWIN.

[The next letter refers to a projected conjoint article on vivisection, to which Mr. Romanes wished my father to contribute :]

C. Darwin to G. J. Romanes.

Down, September 2, 1881.

MY DEAR ROMANES,—Your letter has perplexed me beyond all measure. I fully recognise the duty of every one whose opinion is worth anything, expressing his opinion publicly on vivisection; and this made me send my letter to the *Times*. I have been thinking at intervals all morning what I could say, and it is the simple truth that I have nothing worth saying. You and men like you, whose ideas flow freely, and who can express them easily, cannot understand the state of mental paralysis in which I find myself. What is most wanted is a careful and accurate attempt to show what physiology has already done for man, and even still more strongly what there is every reason to believe it will hereafter do. Now I am absolutely incapable of doing this, or of discussing the other points suggested by you.

If you wish for my name (and I should be glad that it should appear with that of others in the same cause), could you not quote some sentence from my letter in the *Times* which I enclose, but please return it. If you thought fit you might say you quoted it with my approval, and that after still further reflection I still abide most strongly in my expressed conviction.

For Heaven's sake, do think of this. I do not grudge the labour and thought; but I could write nothing worth any one reading.

Allow me to demur to your calling your conjoint article a "symposium" strictly a "drinking party." This seems to me very bad taste, and I do hope every one of you will avoid any semblance of a joke on the subject. I *know* that words, like a joke, on this subject have quite disgusted some persons not at all inimical to physiology. One person lamented to me that Mr. Simon, in his truly admirable Address at the Medical Congress (by far the best thing which I have read), spoke of the fantastic *sensuality** (or some such term) of the many mistaken, but honest men and women who are half mad on the subject. . . .

[To Dr. Lauder Brunton my father wrote in February 1882 :—

"Have you read Mr. [Edmund] Gurney's articles in the 'Fortnightly'† and 'Cornhill'?‡ They seem to me very clever, though obscurely written, and I agree with almost everything he says, except with some passages which appear to imply that no experiments should be tried unless some immediate good can be predicted, and this is a gigantic mistake contradicted by the whole history of science."]

* 'Transactions of the International Medical Congress,' 1881, vol. iv. p. 413. The expression "lackadaisical" (not fantastic), and "feeble sensuality," are used with regard to the feelings of the anti-vivisectionists.

† "A chapter in the Ethics of Pain," 'Fortnightly Review,' 1881, vol. xxx. p. 778.

‡ "An Epilogue on Vivisection," 'Cornhill Magazine,' 1882, vol. xlv. p. 191.

CHAPTER IX.

MISCELLANEA (*continued*)—A REVIVAL OF GEOLOGICAL WORK
—THE BOOK ON EARTHWORMS—LIFE OF ERASMUS DAR-
WIN—MISCELLANEOUS LETTERS.

1876-1882.

[WE have now to consider the work (other than botanical) which occupied the concluding six years of my father's life. A letter to his old friend Rev. L. Blomefield (Jenyns), written in March, 1877, shows what was my father's estimate of his own powers of work at this time:—

"MY DEAR JENYNS (I see I have forgotten your proper names).—Your extremely kind letter has given me warm pleasure. As one gets old, one's thoughts turn back to the past rather than to the future, and I often think of the pleasant, and to me valuable, hours which I spent with you on the borders of the Fens.

"You ask about my future work; I doubt whether I shall be able to do much more that is new, and I always keep before my mind the example of poor old —, who in his old age had a cacoethes for writing. But I cannot endure doing nothing, so I suppose that I shall go on as long as I can without obviously making a fool of myself. I have a great mass of matter with respect to variation under nature; but so much has been published since the appearance of the 'Origin of Species,' that I very much doubt whether I retain power of mind and strength to reduce the mass into a digested whole. I have sometimes thought that I would try, but dread the attempt. . . ."

His prophecy proved to be a true one with regard to any continuation of any general work in the direction of Evolution, but his estimate of powers which could afterwards prove capable of grappling with the 'Power of Movement in Plants,' and with the work on 'Earthworms,' was certainly a low one.

The year 1876, with which the present chapter begins, brought with it a revival of geological work. He had been astonished, as I hear from Professor Judd, and as appears in his letters, to learn that his books on 'Volcanic Islands,' 1844, and on 'South America,' 1846, were still consulted by geologists, and it was a surprise to him that new editions should be required. Both these works were originally published by Messrs. Smith and Elder, and the new edition of 1876 was also brought out by them. This appeared in one volume with the title 'Geological Observations on the Volcanic Islands, and Parts of South America visited during the Voyage of H.M.S. *Beagle*.' He has explained in the preface his reasons for leaving untouched the text of the original editions: "They relate to parts of the world which have been so rarely visited by men of science, that I am not aware that much could be corrected or added from observations subsequently made. Owing to the great progress which Geology has made within recent times, my views on some few points may be somewhat antiquated; but I have thought it best to leave them as they originally appeared."

It may have been the revival of geological speculation, due to the revision of his early books, that led to his recording the observations of which some account is given in the following letter. Part of it has been published in Professor James Geikie's 'Prehistoric Europe,' chaps. vii. and ix.,* a few verbal alterations having been made at my father's request in the passages quoted. Mr. Geikie lately wrote to me: "The views suggested in his letter as to the origin of the

* My father's suggestion is also noticed in Prof Geikie's address on the 'Ice Age in Europe and North America,' given at Edinburgh, Nov. 20, 1884.

angular gravels, &c., in the South of England will, I believe, come to be accepted as the truth. This question has a much wider bearing than might at first appear. In point of fact it solves one of the most difficult problems in Quaternary Geology—and has already attracted the attention of German geologists.”]

C. Darwin to James Geikie.

Down, November 16, 1876.

MY DEAR SIR,—I hope that you will forgive me for troubling you with a very long letter. But first allow me to tell you with what extreme pleasure and admiration I have just finished reading your ‘Great Ice Age.’ It seems to me admirably done, and most clear. Interesting as many chapters are in the history of the world, I do not think that any one comes [up] nearly to the glacial period or periods. Though I have steadily read much on the subject, your book makes the whole appear almost new to me.

I am now going to mention a small observation, made by me two or three years ago, near Southampton, but not followed out, as I have no strength for excursions. I need say nothing about the character of the drift there (which includes palæolithic celts), for you have described its essential features in a few words at p. 506. It covers the whole country [in an] even plain-like surface, almost irrespective of the present outline of the land.

The coarse stratification has sometimes been disturbed. I find that you allude “to the larger stones often standing on end;” and this is the point which struck me so much. Not only moderately sized angular stones, but small oval pebbles often stand vertically up, in a manner which I have never seen in ordinary gravel beds. This fact reminded me of what occurs near my home, in the stiff red clay, full of unworn flints over the chalk, which is no doubt the residue left undissolved by rain water. In this clay, flints as long and thin as my arm often stand perpendicularly up; and I have been told by the tank-diggers that it is their “natural position!”

I presume that this position may safely be attributed to the differential movement of parts of the red clay as it subsided very slowly from the dissolution of the underlying chalk; so that the flints arrange themselves in the lines of least resistance. The similar but less strongly marked arrangement of the stones in the drift near Southampton makes me suspect that it also must have slowly subsided: and the notion has crossed my mind that during the commencement and height of the glacial period great beds of frozen snow accumulated over the south of England, and that, during the summer, gravel and stones were washed from the higher land over its surface, and in superficial channels. The larger streams may have cut right through the frozen snow, and deposited gravel in lines at the bottom. But on each succeeding autumn, when the running water failed, I imagine that the lines of drainage would have been filled up by blown snow afterwards congealed, and that, owing to great surface accumulations of snow, it would be a mere chance whether the drainage, together with gravel and sand, would follow the same lines during the next summer. Thus, as I apprehend, alternate layers of frozen snow and drift, in sheets and lines, would ultimately have covered the country to a great thickness, with lines of drift probably deposited in various directions at the bottom by the larger streams. As the climate became warmer, the lower beds of frozen snow would have melted with extreme slowness, and the many irregular beds of interstratified drift would have sunk down with equal slowness; and during this movement the elongated pebbles would have arranged themselves more or less vertically. The drift would also have been deposited almost irrespective of the outline of the underlying land. When I viewed the country I could not persuade myself that any flood, however great, could have deposited such coarse gravel over the almost level platforms between the valleys. My view differs from that of Holst, p. 415 ['Great Ice Age'], of which I had never heard, as his relates to channels cut through glaciers, and mine to beds of drift interstratified with frozen snow where no gla-

ciers existed. The upshot of this long letter is to ask you to keep my notion in your head, and look out for upright pebbles in any lowland country which you may examine, where glaciers have not existed. Or if you think the notion deserves any further thought, but not otherwise, to tell any one of it, for instance Mr. Skertchly, who is examining such districts. Pray forgive me for writing so long a letter, and again thanking you for the great pleasure derived from your book,

I remain yours very faithfully,

CH. DARWIN.

P.S. . . . I am glad that you have read Blytt; * his paper seemed to me a most important contribution to Botanical Geography. How curious that the same conclusions should have been arrived at by Mr. Skertchly, who seems to be a first-rate observer; and this implies, as I always think, a sound theoriser.

I have told my publisher to send you in two or three days a copy (second edition) of my geological work during the voyage of the *Beagle*. The sole point which would perhaps interest you is about the steppe-like plains of Patagonia.

For many years past I have had fearful misgivings that it must have been the level of the sea, and not that of the land which has changed.

I read a few months ago your [brother's] very interesting life of Murchison.† Though I have always thought that he ranked next to W. Smith in the classification of formations, and though I knew how kind-hearted [he was], yet the book has raised him greatly in my respect, notwithstanding his foibles and want of broad philosophical views.

[The only other geological work of his later years was embodied in his book on earthworms (1881), which may

* Axel Blytt.—'Essay on the Immigration of the Norwegian Flora during alternate rainy and dry Seasons.' Christiania, 1876.

† By Mr. Archibald Geikie.

therefore be conveniently considered in this place. This subject was one which had interested him many years before this date, and in 1838 a paper on the formation of mould was published in the Proceedings of the Geological Society (see vol. i. p. 255).

Here he showed that "fragments of burnt marl, cinders, &c., which had been thickly strewed over the surface of several meadows were found after a few years lying at a depth of some inches beneath the turf, but still forming a layer." For the explanation of this fact, which forms the central idea of the geological part of the book, he was indebted to his uncle Josiah Wedgwood, who suggested that worms, by bringing earth to the surface in their castings, must undermine any objects lying on the surface and cause an apparent sinking.

In the book of 1881 he extended his observations on this burying action, and devised a number of different ways of checking his estimates as to the amount of work done.* He also added a mass of observations on the habits, natural history and intelligence of worms, a part of the work which added greatly to its popularity.

In 1877 Sir Thomas Farrer had discovered close to his garden the remains of a building of Roman-British times, and thus gave my father the opportunity of seeing for himself the effects produced by earthworms' work on the old concrete-floors, walls, &c. On his return he wrote to Sir Thomas Farrer :—

"I cannot remember a more delightful week than the last. I know very well that E. will not believe me, but the worms were by no means the sole charm."

* He received much valuable help from Dr. King, of the Botanical Gardens, Calcutta. The following passage is from a letter to Dr. King, dated January 18, 1873 :—

"I really do not know how to thank you enough for the immense trouble which you have taken. You have attended *exactly* and *fully* to the points about which I was most anxious. If I had been each evening by your side, I could not have suggested anything else."

In the autumn of 1880, when the 'Power of Movement in Plants' was nearly finished, he began once more on the subject. He wrote to Professor Carus (September 21):—

"In the intervals of correcting the press, I am writing a very little book, and have done nearly half of it. Its title will be (as at present designed) 'The Formation of Vegetable Mould through the Action of Worms.'* As far as I can judge it will be a curious little book."

The manuscript was sent to the printers in April, 1881, and when the proof-sheets were coming in he wrote to Professor Carus: "The subject has been to me a hobby-horse, and I have perhaps treated it in foolish detail."

It was published on October 10, and 2000 copies were sold at once. He wrote to Sir J. D. Hooker, "I am glad that you approve of the 'Worms.' When in old days I used to tell you whatever I was doing, if you were at all interested, I always felt as most men do when their work is finally published."

To Mr. Mellard Reade he wrote (November 8): "It has been a complete surprise to me how many persons have cared for the subject." And to Mr. Dyer (in November): "My book has been received with almost laughable enthusiasm, and 3500 copies have been sold!!!" Again, to his friend Mr. Anthony Rich, he wrote on February 4, 1882, "I have been plagued with an endless stream of letters on the subject; most of them very foolish and enthusiastic; but some containing good facts which I have used in correcting yesterday the 'Sixth Thousand.'" The popularity of the book may be roughly estimated by the fact that, in the three years following its publication, 8500 copies were sold—a sale relatively greater than that of the 'Origin of Species.'

It is not difficult to account for its success with the non-scientific public. Conclusions so wide and so novel, and so easily understood, drawn from the study of creatures so fa-

* The full title is 'The Formation of Vegetable Mould through the Action of Worms with Observations on their Habits,' 1881.

miliar, and treated with unabated vigor and freshness, may well have attracted many readers. A reviewer remarks: "In the eyes of most men . . . the earthworm is a mere blind, dumb, senseless, and unpleasantly slimy annelid. Mr. Darwin undertakes to rehabilitate his character, and the earthworm steps forth at once as an intelligent and beneficent personage, a worker of vast geological changes, a planer down of mountain sides. . . . a friend of man. . . and an ally of the Society for the preservation of ancient monuments." The *St. James's Gazette*, October 17, 1881, pointed out that the teaching of the cumulative importance of the infinitely little is the point of contact between this book and the author's previous work.

One more book remains to be noticed, the 'Life of Erasmus Darwin.'

In February 1879 an essay by Dr. Ernst Krause, on the scientific work of Erasmus Darwin, appeared in the evolutionary journal, 'Kosmos.' The number of 'Kosmos' in question was a "Gratulationsheft,"* or special congratulatory issue in honour of my father's birthday, so that Dr. Krause's essay, glorifying the older evolutionist, was quite in its place. He wrote to Dr. Krause, thanking him cordially for the honour paid to Erasmus, and asking his permission to publish † an English translation of the Essay.

His chief reason for writing a notice of his grandfather's life was "to contradict flatly some calumnies by Miss Seward." This appears from a letter of March 27, 1879, to his cousin Reginald Darwin, in which he asks for any documents and letters which might throw light on the character of Erasmus. This led to Mr. Reginald Darwin placing in my father's hands a quantity of valuable material, including a curious

* The same number contains a good biographical sketch of my father, of which the material was to a large extent supplied by him to the writer, Professor Preyer of Jena. The article contains an excellent list of my father's publications.

† The wish to do so was shared by his brother, Erasmus Darwin the younger, who continued to be associated with the project.

folio common-place book, of which he wrote : " I have been deeply interested by the great book, . . . reading and looking at it is like having communion with the dead . . . [it] has taught me a good deal about the occupations and tastes of our grandfather." A subsequent letter (April 8) to the same correspondent describes the source of a further supply of material :—

" Since my last letter I have made a strange discovery ; for an old box from my father marked " Old Deeds," and which consequently I had never opened, I found full of letters—hundreds from Dr. Erasmus—and others from old members of the Family : some few very curious. Also a drawing of Elston before it was altered, about 1750, of which I think I will give a copy."

Dr. Krause's contribution formed the second part of the ' Life of Erasmus Darwin,' my father supplying a " preliminary notice." This expression on the title-page is somewhat misleading ; my father's contribution is more than half the book, and should have been described as a biography. Work of this kind was new to him, and he wrote doubtfully to Mr. Thiselton Dyer, June 18th : " God only knows what I shall make of his life, it is such a new kind of work to me." The strong interest he felt about his forebears helped to give zest to the work, which became a decided enjoyment to him. With the general public the book was not markedly successful, but many of his friends recognised its merits. Sir J. D. Hooker was one of these, and to him my father wrote, " Your praise of the Life of Dr. D. has pleased me exceedingly, for I despised my work, and thought myself a perfect fool to have undertaken such a job."

To Mr. Galton, too, he wrote, November 14 :—

" I am *extremely* glad that you approve of the little ' Life ' of our grandfather, for I have been repenting that I ever undertook it, as the work was quite beyond my tether."

The publication of the ' Life of Erasmus Darwin ' led to an attack by Mr. Samuel Butler, which amounted to a charge of falsehood against my father. After consulting his friends,

he came to the determination to leave the charge unanswered, as unworthy of his notice.* Those who wish to know more of the matter, may gather the facts of the case from Ernst Krause's 'Charles Darwin,' and they will find Mr. Butler's statement of his grievance in the *Athenæum*, January 31, 1880, and in the *St. James's Gazette*, December 8, 1880. The affair gave my father much pain, but the warm sympathy of those whose opinion he respected soon helped him to let it pass into a well-merited oblivion.

The following letter refers to M. J. H. Fabre's 'Souvenirs Entomologiques.' It may find a place here, as it contains a defence of Erasmus Darwin on a small point. The postscript is interesting, as an example of one of my father's bold ideas both as to experiment and theory :]

C. Darwin to J. H. Fabre.

Down, January 31, 1880.

MY DEAR SIR,—I hope that you will permit me to have the satisfaction of thanking you cordially for the lively pleasure which I have derived from reading your book. Never have the wonderful habits of insects been more vividly described, and it is almost as good to read about them as to see them. I feel sure that you would not be unjust to even an insect, much less to a man. Now, you have been misled by some translator, for my grandfather, Erasmus Darwin, states ('Zoonomia,' vol. i. p. 183, 1794) that it was a wasp (guêpe) which he saw cutting off the wings of a large fly. I have no doubt that you are right in saying that the wings are generally cut off instinctively ; but in the case described by my grandfather, the wasp, after cutting off the two ends of the body, rose in the air, and was turned round by the wind ; he then alighted and cut off the wings. I must believe, with Pierre Huber, that insects have "une petite dose de raison."

* He had, in a letter to Mr. Butler, expressed his regret at the oversight which caused so much offence.

In the next edition of your book, I hope that you will alter *part* of what you say about my grandfather.

I am sorry that you are so strongly opposed to the Descent theory; I have found the searching for the history of each structure or instinct an excellent aid to observation; and wonderful observer as you are, it would suggest new points to you. If I were to write on the evolution of instincts, I could make good use of some of the facts which you give. Permit me to add, that when I read the last sentence in your book, I sympathised deeply with you.*

With the most sincere respect,

I remain, dear Sir, yours faithfully,

CHARLES DARWIN.

P.S.—Allow me to make a suggestion in relation to your wonderful account of insects finding their way home. I formerly wished to try it with pigeons: namely, to carry the insects in their paper “cornets,” about a hundred paces in the opposite direction to that which you ultimately intended to carry them; but before turning round to return, to put the insect in a circular box, with an axle which could be made to revolve very rapidly, first in one direction, and then in another, so as to destroy for a time all sense of direction in the insects. I have sometimes *imagined* that animals may feel in which direction they were at the first start carried.† If this plan failed, I had intended placing the pigeons within

* The book is intended as a memorial of the early death of M. Fabre's son, who had been his father's assistant in his observations on insect life.

† This idea was a favourite one with him, and he has described in ‘Nature’ (vol. vii. 1873, p. 360) the behaviour of his cob Tommy, in whom he fancied he detected a sense of direction. The horse had been taken by rail from Kent to the Isle of Wight; when there he exhibited a marked desire to go eastward, even when his stable lay in the opposite direction. In the same volume of ‘Nature,’ p. 417, is a letter on the ‘Origin of Certain Instincts,’ which contains a short discussion on the sense of direction.

an induction coil, so as to disturb any magnetic or dia-magnetic sensibility, which it seems just possible that they may possess.

C. D.

[During the latter years of my father's life there was a growing tendency in the public to do him honour. In 1877 he received the honorary degree of LL.D. from the University of Cambridge. The degree was conferred on November 17, and with the customary Latin speech from the Public Orator, concluding with the words: "*Tu vero, qui leges naturæ tam docte illustraveris, legum doctor nobis esto.*"

The honorary degree led to a movement being set on foot in the University to obtain some permanent memorial of my father. A sum of about £400 was subscribed, and after the rejection of the idea that a bust would be the best memorial, a picture was determined on. In June 1879 he sat to Mr. W. Richmond for the portrait in the possession of the University, now placed in the Library of the philosophical Society at Cambridge. He is represented seated in his Doctor's gown, the head turned towards the spectator: the picture has many admirers, but, according to my own view, neither the attitude nor the expression are characteristic of my father.

A similar wish on the part of the Linnean Society—with which my father was so closely associated—led to his sitting in August, 1881, to Mr. John Collier, for the portrait now in the possession of the Society. Of the artist, he wrote, "Collier was the most considerate, kind and pleasant painter a sitter could desire." The portrait represents him standing facing the observer in the loose cloak so familiar to those who knew him, and with his slouch hat in his hand. Many of those who knew his face most intimately, think that Mr. Collier's picture is the best of the portraits, and in this judgment the sitter himself was inclined to agree. According to my feeling it is not so simple or strong a representation of him as that given by Mr. Oules. There is a certain expression in Mr. Collier's portrait which I am inclined to consider an exaggeration of the almost painful expression which

Professor Cohn has described in my father's face, and which he had previously noticed in Humboldt. Professor Cohn's remarks occur in a pleasantly written account of a visit to Down* in 1876, published in the *Breslauer Zeitung*, April 23, 1882.

Besides the Cambridge degree, he received about the same time honours of an academic kind from some foreign societies.

On August 5, 1878, he was elected a Corresponding Member of the French Institute † in the Botanical Section, ‡ and wrote to Dr. Asa Gray:—

“I see that we are both elected Corresponding Members

* In this connection may be mentioned a visit (1881) from another distinguished German, Hans Richter. The occurrence is otherwise worthy of mention, inasmuch as it led to the publication, after my father's death, of Herr Richter's recollections of the visit. The sketch is simply and sympathetically written, and the author has succeeded in giving a true picture of my father as he lived at Down. It appeared in the *Neue Tagblatt* of Vienna, and was republished by Dr. O. Zacharias in his ‘Charles R. Darwin,’ Berlin, 1882.

† “Lyell always spoke of it as a great scandal that Darwin was so long kept out of the French Institute. As he said, even if the development hypothesis were objected to, Darwin's original works on Coral Reefs, the Cirripedia, and other subjects, constituted a more than sufficient claim.”—From Professor Judd's notes.

‡ The statement has been more than once published that he was elected to the Zoological Section, but this was not the case.

He received twenty-six votes out of a possible 39, five blank papers were sent in, and eight votes were recorded for the other candidates.

In 1872 an attempt had been made to elect him to the Section of Zoology, when, however, he only received 15 out of 48 votes, and Lovén was chosen for the vacant place. It appears (‘Nature,’ August 1, 1872) that an eminent member of the Academy wrote to *Les Mondes* to the following effect:—

“What has closed the doors of the Academy to Mr. Darwin is that the science of those of his books which have made his chief title to fame—the ‘Origin of Species,’ and still more the ‘Descent of Man,’ is not science, but a mass of assertions and absolutely gratuitous hypotheses, often evidently fallacious. This kind of publication and these theories are a bad example, which a body that respects itself cannot encourage.”

of the Institute. It is rather a good joke that I should be elected in the Botanical Section, as the extent of my knowledge is little more than that a daisy is a Compositous plant and a pea a Leguminous one."

In the early part of the same year he was elected a Corresponding Member of the Berlin Academy of Sciences, and he wrote (March 12) to Professor Du Bois Reymond, who had proposed him for election:—

"I thank you sincerely for your most kind letter, in which you announce the great honour conferred on me. The knowledge of the names of the illustrious men, who seconded the proposal is even a greater pleasure to me than the honour itself."

The seconders were Helmholtz, Peters, Ewald, Pringsheim and Virchow.

In 1879 he received the Baly Medal of the Royal College of Physicians.*

Again in 1879 he received from the Royal Academy of Turin the *Bressa* Prize for the years 1875-78, amounting to the sum of 12,000 francs. In the following year he received on his birthday, as on previous occasions, a kind letter of congratulation from Dr. Dohrn of Naples. In writing (February 15th) to thank him and the other naturalists at the Zoological Station, my father added:—

"Perhaps you saw in the papers that the Turin Society honoured me to an extraordinary degree by awarding me the *Bressa* Prize. Now it occurred to me that if your station

* The visit to London, necessitated by the presentation of the Baly Medal, was combined with a visit to Miss Forster's house at Abinger, in Surrey, and this was the occasion of the following characteristic letter:—
"I must write a few words to thank you cordially for lending us your house. It was a most kind thought, and has pleased me greatly; but I know well that I do not deserve such kindness from any one. On the other hand, no one can be too kind to my dear wife, who is worth her weight in gold many times over, and she was anxious that I should get some complete rest, and here I cannot rest. Your house will be a delightful haven, and again I thank you truly."

wanted some pieces of apparatus, of about the value of £100, I should very much like to be allowed to pay for it. Will you be so kind as to keep this in mind, and if any want should occur to you, I would send you a cheque at any time."

I find from my father's accounts that £100 was presented to the Naples Station.

He received also several tokens of respect and sympathy of a more private character from various sources. With regard to such incidents and to the estimation of the public generally, his attitude may be illustrated by a passage from a letter to Mr. Romanes :—*

"You have indeed passed a most magnificent eulogium upon me, and I wonder that you were not afraid of hearing 'oh! oh!' or some other sign of disapprobation. Many persons think that what I have done in science has been much overrated, and I very often think so myself; but my comfort is that I have never consciously done anything to gain applause. Enough and too much about my dear self."

Among such expressions of regard he valued very highly the two photographic albums received from Germany and Holland on his birthday, 1877. Herr Emil Rade of Münster, originated the idea of the German birthday gift, and undertook the necessary arrangements. To him my father wrote (February 16, 1877) :—

"I hope that you will inform the one hundred and fifty-four men of science, including some of the most highly honoured names in the world, how grateful I am for their kindness and generous sympathy in having sent me their photographs on my birthday."

To Professor Haeckel he wrote (February 16, 1877) :—

"The album has just arrived quite safe. It is most superb.† It is by far the greatest honour which I have ever re-

* The lecture referred to was given at the Dublin meeting of the British Association.

† The album is magnificently bound and decorated with a beautifully illuminated title page, the work of an artist, Herr A. Fitger of Bremen, who also contributed the dedicatory poem.

ceived, and my satisfaction has been greatly enhanced by your most kind letter of February 9. . . . I thank you all from my heart. I have written by this post to Herr Rade, and I hope he will somehow manage to thank all my generous friends."

To Professor A. van Bemmelen he wrote, on receiving a similar present from a number of distinguished men and lovers of Natural History in the Netherlands:—

"SIR,—I received yesterday the magnificent present of the album, together with your letter. I hope that you will endeavour to find some means to express to the two hundred and seventeen distinguished observers and lovers of natural science, who have sent me their photographs, my gratitude for their extreme kindness. I feel deeply gratified by this gift, and I do not think that any testimonial more honourable to me could have been imagined. I am well aware that my books could never have been written, and would not have made any impression on the public mind, had not an immense amount of material been collected by a long series of admirable observers; and it is to them that honour is chiefly due. I suppose that every worker at science occasionally feels depressed, and doubts whether what he has published has been worth the labour which it has cost him, but for the few remaining years of my life, whenever I want cheering, I will look at the portraits of my distinguished co-workers in the field of science, and remember their generous sympathy. When I die, the album will be a most precious bequest to my children. I must further express my obligation for the very interesting history contained in your letter of the progress of opinion in the Netherlands, with respect to Evolution, the whole of which is quite new to me. I must again thank all my kind friends, from my heart, for their ever-memorable testimonial, and I remain, Sir,

Your obliged and grateful servant,

CHARLES R. DARWIN."

[In the June of the following year (1878) he was gratified

by learning that the Emperor of Brazil had expressed a wish to meet him. Owing to absence from home my father was unable to comply with this wish; he wrote to Sir J. D. Hooker:—

“The Emperor has done so much for science, that every scientific man is bound to show him the utmost respect, and I hope that you will express in the strongest language, and which you can do with entire truth, how greatly I feel honoured by his wish to see me; and how much I regret my absence from home.”

Finally it should be mentioned that in 1880 he received an address personally presented by members of the Council of the Birmingham Philosophical Society, as well as a memorial from the Yorkshire Naturalist Union presented by some of the members, headed by Dr. Sorby. He also received in the same year a visit from some of the members of the Lewis-ham and Blackheath Scientific Association,—a visit which was, I think, enjoyed by both guests and host.]

MISCELLANEOUS LETTERS—1876-1882.

[The chief incident of a personal kind (not already dealt with) in the years which we are now considering was the death of his brother Erasmus, who died at his house in Queen Anne Street, on August 26th, 1881. My father wrote to Sir J. D. Hooker (Aug. 30):—

“The death of Erasmus is a very heavy loss to all of us, for he had a most affectionate disposition. He always appeared to me the most pleasant and clearest headed man, whom I have ever known. London will seem a strange place to me without his presence; I am deeply glad that he died without any great suffering, after a very short illness from mere weakness and not from any definite disease.*

“I cannot quite agree with you about the death of the old

* “He was not, I think, a happy man, and for many years did not value life, though never complaining.”—From a letter to Sir Thomas Farrer.

and young. Death in the latter case, when there is a bright future ahead, causes grief never to be wholly obliterated."

An incident of a happy character may also be selected for especial notice, since it was one which strongly moved my father's sympathy. A letter (Dec. 17, 1879) to Sir Joseph Hooker shows that the possibility of a Government Pension being conferred on Mr. Wallace first occurred to my father at this time. The idea was taken up by others, and my father's letters show that he felt the most lively interest in the success of the plan. He wrote, for instance, to Mrs. Fisher, "I hardly ever wished for anything more than I do for the success of our plan." He was deeply pleased when this thoroughly deserved honour was bestowed on his friend, and wrote to the same correspondent (January 7, 1881), on receiving a letter from Mr. Gladstone announcing the fact: "How extraordinarily kind of Mr. Gladstone to find time to write under the present circumstances.* Good heavens! how pleased I am!"

The letters which follow are of a miscellaneous character and refer principally to the books he read, and to his minor writings.]

C. Darwin to Miss Buckley (Mrs. Fisher).

Down, February 11 [1876].

MY DEAR MISS BUCKLEY,—You must let me have the pleasure of saying that I have just finished reading with very great interest your new book.† The idea seems to me a capital one, and as far as I can judge very well carried out. There is much fascination in taking a bird's eye view of all the grand leading steps in the progress of science. At first I regretted that you had not kept each science more separate; but I dare say you found it impossible. I have hardly any

* Mr. Gladstone was then in office, and the letter must have been written when he was overwhelmed with business connected with the opening of Parliament (Jan. 6).

† 'A Short History of Natural Science.'

criticisms, except that I think you ought to have introduced Murchison as a great classifier of formations, second only to W. Smith. You have done full justice, and not more than justice, to our dear old master, Lyell. Perhaps a little more ought to have been said about botany, and if you should ever add this, you would find Sachs' 'History,' lately published, very good for your purpose.

You have crowned Wallace and myself with much honour and glory. I heartily congratulate you on having produced so novel and interesting a work, and remain,

My dear Miss Buckley, yours very faithfully,

CH. DARWIN.

C. Darwin to A. R. Wallace.

[Hopedene] *, June 5, 1876.

MY DEAR WALLACE,—I must have the pleasure of expressing to you my unbounded admiration of your book,† tho' I have read only to page 184—my object having been to do as little as possible while resting. I feel sure that you have laid a broad and safe foundation for all future work on Distribution. How interesting it will be to see hereafter plants treated in strict relation to your views; and then all insects, pulmonate molluscs and fresh-water fishes, in greater detail than I suppose you have given to these lower animals. The point which has interested me most, but I do not say the most valuable point, is your protest against sinking imaginary continents in a quite reckless manner, as was stated by Forbes, followed, alas, by Hooker, and caricatured by Wollaston and [Andrew] Murray! By the way, the main impression that the latter author has left on my mind is his utter want of all scientific judgment. I have lifted up my voice against the above view with no avail, but I have no doubt that you will succeed, owing to your new arguments and the coloured chart. Of a special value, as it seems to me, is the conclusion

* Mr. Hensleigh Wedgwood's house in Surrey.

† 'Geographical Distribution,' 1876.

that we must determine the areas, chiefly by the nature of the mammals. When I worked many years ago on this subject, I doubted much whether the now called Palæarctic and Nearctic regions ought to be separated; and I determined if I made another region that it should be Madagascar. I have, therefore, been able to appreciate your evidence on these points. What progress Palæontology has made during the last 20 years; but if it advances at the same rate in the future, our views on the migration and birth-place of the various groups will, I fear, be greatly altered. I cannot feel quite easy about the Glacial period, and the extinction of large mammals, but I must hope that you are right. I think you will have to modify your belief about the difficulty of dispersal of land molluscs; I was interrupted when beginning to experimentize on the just hatched young adhering to the feet of ground-roosting birds. I differ on one other point, viz. in the belief that there must have existed a Tertiary Antarctic continent, from which various forms radiated to the southern extremities of our present continents. But I could go on scribbling for ever. You have written, as I believe, a grand and memorable work which will last for years as the foundation for all future treatises on Geographical Distribution. My dear Wallace, yours very sincerely,

CHARLES DARWIN.

P.S.—You have paid me the highest conceivable compliment, by what you say of your work in relation to my chapters on distribution in the ‘Origin,’ and I heartily thank you for it.

[The following letters illustrate my father’s power of taking a vivid interest in work bearing on Evolution, but unconnected with his own special researches at the time. The books referred to in the first letter are Professor Weismann’s ‘*Studien zur Descendenzlehre*,’* being part of the series of

* My father contributed a prefatory note to Mr. Meldola’s translation of Prof. Weismann’s ‘*Studein*,’ 1880–81.

essays by which the author has done such admirable service to the cause of evolution :]

C. Darwin to Aug. Weismann.

January 12, 1877.

. . . I read German so slowly, and have had lately to read several other papers, so that I have as yet finished only half of your first essay and two-thirds of your second. They have excited my interest and admiration in the highest degree, and whichever I think of last, seems to me the most valuable. I never expected to see the coloured marks on caterpillars so well explained; and the case of the ocelli delights me especially. . . .

. . . There is one other subject which has always seemed to me more difficult to explain than even the colours of caterpillars, and that is the colour of birds' eggs, and I wish you would take this up.

C. Darwin to Melchior Neumayr, Vienna.*

Down, Beckenham, Kent, March 9, 1877.

DEAR SIR,—From having been obliged to read other books, I finished only yesterday your essay on 'Die Congerien,' &c.†

I hope that you will allow me to express my gratitude for the pleasure and instruction which I have derived from reading it. It seems to me to be an admirable work; and is by far the best case which I have ever met with, showing the direct influence of the conditions of life on the organization.

Mr. Hyatt, who has been studying the Hilgendorf case, writes to me with respect to the conclusions at which he has arrived, and these are nearly the same as yours. He insists that closely similar forms may be derived from distinct lines of descent; and this is what I formerly called analogical variation. There can now be no doubt that species may become greatly modified through the direct action of the envi-

* Professor of Palæontology at Vienna.

† 'Die Congerien und Paludinea dichten Slavoniens,' 4to, 1875.

ronment. I have some excuse for not having formerly insisted more strongly on this head in my 'Origin of Species,' as most of the best facts have been observed since its publication.

With my renewed thanks for your most interesting essay, and with the highest respect, I remain, dear Sir,

Yours very faithfully,

CHARLES DARWIN.

C. Darwin to E. S. Morse.

Down, April 23, 1877.

MY DEAR SIR,—You must allow me just to tell you how very much I have been interested with the excellent Address* which you have been so kind as to send me, and which I had much wished to read. I believe that I had read all, or very nearly all, the papers by your countrymen to which you refer, but I have been fairly astonished at their number and importance when seeing them thus put together. I quite agree about the high value of Mr Allen's works,† as showing how much change may be expected apparently through the direct action of the conditions of life. As for the fossil remains in the West, no words will express how wonderful they are. There is one point which I regret that you did not make clear in your Address, namely what is the meaning and importance of Professors Cope and Hyatt's views on acceleration and retardation. I have endeavoured, and given up in despair, the attempt to grasp their meaning.

Permit me to thank you cordially for the kind feeling shown towards me through your Address, and I remain, my dear Sir,

Yours faithfully,

CH. DARWIN.

* "What American Zoologists have done for Evolution," an Address to the American Association for the Advancement of Science, August, 1876. Vol. xxv. of the Proceedings of the Association.

† Mr. J. A. Allen shows the existence of geographical races of birds and mammals. Proc. Boston Soc. Nat. Hist. vol. xv.

[The next letter refers to his 'Biographical Sketch of an Infant,' written from notes made 37 years previously, and published in 'Mind,' July, 1877. The article attracted a good deal of attention, and was translated at the time in 'Kosmos,' and the 'Revue Scientifique,' and has been recently published in Dr. Krause's 'Gesammelte kleinere Schriften von Charles Darwin,' 1887 :]

*C. Darwin to G. Croom Robertson.**

Down, April 27, 1877.

DEAR SIR,—I hope that you will be so good as to take the trouble to read the enclosed MS., and if you think it fit for publication in your admirable journal of 'Mind,' I shall be gratified. If you do not think it fit, as is very likely, will you please to return it to me. I hope that you will read it in an extra critical spirit, as I cannot judge whether it is worth publishing from having been so much interested in watching the dawn of the several faculties in my own infant. I may add that I should never have thought of sending you the MS., had not M. Taine's article appeared in your Journal.† If my MS. is printed, I think that I had better see a proof. I remain, dear Sir,

Yours faithfully,

CH. DARWIN.

[The two following extracts show the lively interest he preserved in diverse fields of inquiry. Professor Cohn, of Breslau had mentioned, in a letter, Koch's researches on Splenic Fever, my father replied, January 3 :—

"I well remember saying to myself, between twenty and thirty years ago, that if ever the origin of any infectious disease could be proved, it would be the greatest triumph to science ; and now I rejoice to have seen the triumph."

* The editor of 'Mind.'

† 1877, p. 252. The original appeared in the 'Revue Philosophique' 1876.

In the spring he received a copy of Dr. E. von Mojsisovics' 'Dolomit Riffe,' his letter to the author (June 1, 1878) is interesting as bearing on the influence of his own work on the methods of geology.

"I have at last found time to read the first chapter of your 'Dolomit Riffe,' and have been *exceedingly* interested by it. What a wonderful change in the future of Geological chronology you indicate, by assuming the descent theory to be established, and then taking the graduated changes of the same group of organisms as the true standard! I never hoped to live to see such a step even proposed by any one."

Another geological research which roused my father's admiration was Mr. D. Mackintosh's work on erratic blocks. Apart from its intrinsic merit the work keenly excited his sympathy from the conditions under which it was executed, Mr. Mackintosh being compelled to give nearly his whole time to tuition. The following passage is from a letter to Mr. Mackintosh of October 9, 1879, and refers to his paper in the *Journal of the Geological Society*, 1878:—

"I hope that you will allow me to have the pleasure of thanking you for the very great pleasure which I have derived from just reading your paper on erratic blocks. The map is wonderful, and what labour each of those lines show! I have thought for some years that the agency of floating ice, which nearly half a century ago was overrated, has of late been underrated. You are the sole man who has ever noticed the distinction suggested by me* between flat or planed scored rocks, and mammillated scored rocks."]

C. Darwin to C. Ridley.

Down, November 28, 1878.

DEAR SIR,—I just skimmed through Dr. Pusey's sermon, as published in the *Guardian*, but it did [not] seem to me

* In his paper on the 'Ancient Glaciers of Carnarvonshire,' *Phil. Mag.* xxi. 1842. See p. 187.

worthy of any attention. As I have never answered criticisms excepting those made by scientific men, I am not willing that this letter should be published; but I have no objection to your saying that you sent me the three questions, and that I answered that Dr. Pusey was mistaken in imagining that I wrote the 'Origin' with any relation whatever to Theology. I should have thought that this would have been evident to any one who had taken the trouble to read the book, more especially as in the opening lines of the introduction I specify how the subject arose in my mind. This answer disposes of your two other questions; but I may add that many years ago, when I was collecting facts for the 'Origin,' my belief in what is called a personal God was as firm as that of Dr. Pusey himself, and as to the eternity of matter I have never troubled myself about such insoluble questions. Dr. Pusey's attack will be as powerless to retard by a day the belief in Evolution, as were the virulent attacks made by divines fifty years ago against Geology, and the still older ones of the Catholic Church against Galileo, for the public is wise enough always to follow Scientific men when they agree on any subject; and now there is almost complete unanimity amongst Biologists about Evolution, though there is still considerable difference as to the means, such as how far natural selection has acted, and how far external conditions, or whether there exists some mysterious innate tendency to perfectability. I remain, dear Sir,

Yours faithfully,

CH. DARWIN.

[Theologians were not the only adversaries of freedom in science. On Sept. 22, 1877, Prof. Virchow delivered an address at the Munich meeting of German Naturalists and Physicians, which had the effect of connecting Socialism with the Descent theory. This point of view was taken up by anti-evolutionists to such an extent that, according to Haeckel, the *Kreuz Zeitung* threw "all the blame of" the "treasonable attempts of the democrats Hödel and Nobiling . . .

directly on the theory of Descent." Prof. Haeckel replied with vigour and ability in his 'Freedom in Science and Teaching' (Eng. Transl. 1879), an essay which must have the sympathy of all lovers of freedom.

The following passage from a letter (December 26, 1879) to Dr. Scherzer, the author of the 'Voyage of the *Novara*,' gives a hint of my father's views on this once burning question:—

"What a foolish idea seems to prevail in Germany on the connection between Socialism and Evolution through Natural Selection."]

*C. Darwin to H. N. Moseley.**

Down, January 20, 1879.

DEAR MOSELEY,—I have just received your book, and I declare that never in my life have I seen a dedication which I admired so much.† Of course I am not a fair judge, but I hope that I speak dispassionately, though you have touched me in my very tenderest point, by saying that my old Journal mainly gave you the wish to travel as a Naturalist. I shall begin to read your book this very evening, and am sure that I shall enjoy it much.

Yours very sincerely,

CH. DARWIN.

C. Darwin to H. N. Moseley.

Down, February 4, 1879.

DEAR MOSELEY,—I have at last read every word of your book, and it has excited in me greater interest than any other

* Professor of Zoology at Oxford. The book alluded to is Prof. Moseley's 'Notes by a Naturalist on the *Challenger*.'

† "To Charles Darwin, Esquire, LL. D., F. R. S., &c., from the study of whose 'Journal of Researches' I mainly derived my desire to travel round the world; to the development of whose theory I owe the principal pleasures and interests of my life, and who has personally given me much kindly encouragement in the prosecution of my studies, this book is, by permission, gratefully dedicated."

scientific book which I have read for a long time. You will perhaps be surprised how slow I have been, but my head prevents me reading except at intervals. If I were asked which parts have interested me most, I should be somewhat puzzled to answer. I fancy that the general reader would prefer your account of Japan. For myself I hesitate between your discussions and description of the Southern ice, which seems to me admirable, and the last chapter which contained many facts and views new to me, though I had read your papers on the stony Hydroid Corals, yet your *résumé* made me realise better than I had done before, what a most curious case it is.

You have also collected a surprising number of valuable facts bearing on the dispersal of plants, far more than in any other book known to me. In fact your volume is a mass of interesting facts and discussions, with hardly a superfluous word; and I heartily congratulate you on its publication.

Your dedication makes me prouder than ever.

Believe me, yours sincerely,

CH. DARWIN.

[In November, 1879, he answered for Mr. Galton a series of questions utilised in his 'Inquiries into Human Faculty,' 1883. He wrote to Mr. Galton:—

"I have answered the questions as well as I could, but they are miserably answered, for I have never tried looking into my own mind. Unless others answer very much better than I can do, you will get no good from your queries. Do you not think you ought to have the age of the answerer? I think so, because I can call up faces of many schoolboys, not seen for sixty years, with *much distinctness*, but nowadays I may talk with a man for an hour, and see him several times consecutively, and, after a month, I am utterly unable to recollect what he is at all like. The picture is quite washed out. The greater number of the answers are given in the annexed table."]

QUESTIONS ON THE FACULTY OF VISUALISING.

	QUESTIONS.	REPLIES.
1	<i>Illumination?</i>	Moderate, but my solitary breakfast was early, and the morning dark.
2	<i>Definition?</i>	Some objects quite defined, a slice of cold beef, some grapes and a pear, the state of my plate when I had finished, and a few other objects, are as distinct as if I had photo's before me.
3	<i>Completeness?</i>	Very moderately so.
4	<i>Colouring?</i>	The objects above named perfectly colored.
5	<i>Extent of Field of View?</i>	Rather small.
	DIFFERENT KINDS OF IMAGERY.	
6	<i>Printed pages.</i>	I cannot remember a single sentence, but I remember the place of the sentence and the kind of type.
7	<i>Furniture?</i>	I have never attended to it.
8	<i>Persons?</i>	I remember the faces of persons formerly well-known vividly, and can make them do anything I like.
9	<i>Scenery?</i>	Remembrance vivid and distinct, and gives me pleasure.
10	<i>Geography?</i>	No.
11	<i>Military movements?</i>	No.
12	<i>Mechanism?</i>	Never tried.
13	<i>Geometry?</i>	I do not think I have any power of the kind.
14	<i>Numerals?</i>	When I think of any number, printed figures arise before my mind. I can't remember for an hour four consecutive figures.
15	<i>Card playing?</i>	Have not played for many years, but I am sure should not remember.
16	<i>Chess?</i>	Never played.

[In 1880 he published a short paper in 'Nature' (vol. xxi. p. 207) on the "Fertility of Hybrids from the common and Chinese goose." He received the hybrids from the Rev. Dr. Goodacre, and was glad of the opportunity of testing the accuracy of the statement that these species are fertile *inter se*. This fact, which was given in the 'Origin' on the authority of Mr. Eyton, he considered the most remarkable as yet recorded with respect to the fertility of hybrids. The fact (as confirmed by himself and Dr. Goodacre) is of interest as giving another proof that sterility is no criterion of specific difference, since the two species of goose now shown to be fertile *inter se* are so distinct that they have been placed by some authorities in distinct genera or subgenera.

The following letter refers to Mr. Huxley's lecture: "The Coming of Age of the Origin of Species," * given at the Royal Institution, April 9, 1880, published in 'Nature,' and in 'Science and Culture,' p. 310:]

C. Darwin to T. H. Huxley.

Abinger Hall, Dorking, Sunday, April 11, 1880.

MY DEAR HUXLEY,—I wished much to attend your Lecture, but I have had a bad cough, and we have come here to see whether a change would do me good, as it has done. What a magnificent success your lecture seems to have been, as I judge from the reports in the *Standard* and *Daily News*, and more especially from the accounts given me by three of my children. I suppose that you have not written out your lecture, so I fear there is no chance of its being printed *in extenso*. You appear to have piled, as on so many other occasions, honours high and thick on my old head. But I well know how great a part you have played in establishing

* This same "Coming of Age" was the subject of an address from the Council of the Otago Institute. It is given in 'Nature,' February 24, 1881.

and spreading the belief in the descent-theory, ever since that grand review in the *Times* and the battle royal at Oxford up to the present day.

Ever my dear Huxley,

Yours sincerely and gratefully,

CHARLES DARWIN.

P.S.—It was absurdly stupid in me, but I had read the announcement of your Lecture, and thought that you meant the maturity of the subject, until my wife one day remarked, "it is almost twenty-one years since the 'Origin' appeared," and then for the first time the meaning of your words flashed on me !

[In the above-mentioned lecture Mr. Huxley made a strong point of the accumulation of palæontological evidence which the years between 1859 and 1880 have given us in favour of Evolution. On this subject my father wrote (August 31, 1880):]

MY DEAR PROFESSOR MARSH,—I received some time ago your very kind note of July 28th, and yesterday the magnificent volume.* I have looked with renewed admiration at the plates, and will soon read the text. Your work on these old birds, and on the many fossil animals of North America has afforded the best support to the theory of Evolution, which has appeared within the last twenty years.† The general appearance of the copy which you have sent me is

* *Odontornithes*. A monograph on the extinct Toothed Birds of N. America. 1880. By O. C. Marsh.

† Mr. Huxley has well pointed out ('Science and Culture,' p. 317) that: "In 1875, the discovery of the toothed birds of the cretaceous formation in N. America, by Prof. Marsh, completed the series of transitional forms between birds and reptiles, and removed Mr. Darwin's proposition that, 'many animal forms of life have been utterly lost, through which the early progenitors of birds were formerly connected with the early progenitors of the other vertebrate classes,' from the region of hypothesis to that of demonstrable fact."

worthy of its contents, and I can say nothing stronger than this.

With cordial thanks, believe me,

Yours very sincerely,

CHARLES DARWIN.

[In November, 1880, he received an account of a flood in Brazil, from which his friend Fritz Müller had barely escaped with his life. My father immediately wrote to Hermann Müller anxiously enquiring whether his brother had lost books, instruments, &c., by this accident, and begging in that case "for the sake of science, so that science should not suffer," to be allowed to help in making good the loss. Fortunately, however, the injury to Fritz Müller's possessions was not so great as was expected, and the incident remains only as a memento, which I trust cannot be otherwise than pleasing to the survivor, of the friendship of the two naturalists.

In 'Nature' (November 11, 1880) appeared a letter from my father, which is, I believe, the only instance in which he wrote publicly with anything like severity. The late Sir Wyville Thomson wrote, in the Introduction to the 'Voyage of the *Challenger*': "The character of the abyssal fauna refuses to give the least support to the theory which refers the evolution of species to extreme variation guided only by natural selection." My father, after characterising these remarks as a "standard of criticism, not uncommonly reached by theologians and metaphysicians," goes on to take exception to the term "extreme variation," and challenges Sir Wyville to name any one who has "said that the evolution of species depends only on natural selection." The letter closes with an imaginary scene between Sir Wyville and a breeder, in which Sir Wyville criticises artificial selection in a somewhat similar manner. The breeder is silent, but on the departure of his critic he is supposed to make use of "emphatic but irreverent language about naturalists." The letter, as originally written, ended with a quotation from Sedgwick on the invulnerability of those who write on what

they do not understand, but this was omitted on the advice of a friend, and curiously enough a friend whose combativeness in the good cause my father had occasionally curbed.]

C. Darwin to G. J. Romanes.

Down, April 16, 1881.

MY DEAR ROMANES,—My MS. on 'Worms' has been sent to the printers, so I am going to amuse myself by scribbling to you on a few points; but you must not waste your time in answering at any length this scribble.

Firstly, your letter on intelligence was very useful to me and I tore up and re-wrote what I sent to you. I have not attempted to define intelligence; but have quoted your remarks on experience, and have shown how far they apply to worms. It seems to me that they must be said to work with some intelligence, anyhow they are not guided by a blind instinct.

Secondly, I was greatly interested by the abstract in 'Nature' of your work on Echinoderms,* the complexity with simplicity, and with such curious co-ordination of the nervous system is marvellous; and you showed me before what splendid gymnastic feats they can perform.

Thirdly, Dr. Roux has sent me a book just published by him: 'Der Kampf der Theile,' &c., 1881 (240 pages in length).

He is manifestly a well-read physiologist and pathologist, and from his position a good anatomist. It is full of reasoning, and this in German is very difficult to me, so that I have only skimmed through each page; here and there reading with a little more care. As far as I can imperfectly judge, it is the most important book on Evolution, which has appeared for some time. I believe that G. H. Lewes hinted at the same fundamental idea, viz. that there is a struggle going on within every organism between the organic molecules, the

* "On the locomotor system of Echinoderms," by G. J. Romanes and J. Cossar Ewart. 'Philosophical Transactions,' 1881, p. 820.

cells and the organs. I think that his basis is, that every cell which best performs its function is, in consequence, at the same time best nourished and best propagates its kind. The book does not touch on mental phenomena, but there is much discussion on rudimentary or atrophied parts, to which subject you formerly attended. Now if you would like to read this book, I would send it. . . . If you read it, and are struck with it (but I may be *wholly* mistaken about its value), you would do a public service by analysing and criticising it in 'Nature.'

Dr. Roux makes, I think, a gigantic oversight in never considering plants; these would simplify the problem for him.

Fourthly, I do not know whether you will discuss in your book on the mind of animals any of the more complex and wonderful instincts. It is unsatisfactory work, as there can be no fossilised instincts, and the sole guide is their state in other members of the same order, and mere *probability*.

But if you do discuss any (and it will perhaps be expected of you), I should think that you could not select a better case than that of the sand wasps, which paralyse their prey, as formerly described by Fabre, in his wonderful paper in the 'Annales des Sciences,' and since amplified in his admirable 'Souvenirs.'

Whilst reading this latter book, I speculated a little on the subject. Astonishing nonsense is often spoken of the sand wasp's knowledge of anatomy. Now will any one say that the Gauchos on the plains of La Plata have such knowledge, yet I have often seen them with a struggling and lassoed cow on the ground with unerring skill, which no mere anatomist could imitate. The pointed knife was infallibly driven in between the vertebræ by a single slight thrust. I presume that the art was first discovered by chance, and that each young Gaucho sees exactly how the others do it, and then with a very little practice learns the art. Now I suppose that the sand wasps originally merely killed their prey by stinging them in many places (see p. 129 of Fabre's 'Souvenirs,' and

p. 241) on the lower and softest side of the body—and that to sting a certain segment was found by far the most successful method; and was inherited like the tendency of a bulldog to pin the nose of a bull, or of a ferret to bite the cerebellum. It would not be a very great step in advance to prick the ganglion of its prey only slightly, and thus to give its larvæ fresh meat instead of old dried meat. Though Fabre insists so strongly on the unvarying character of instinct, yet it is shown that there is some variability, as at p. 176, 177.

I fear that I shall have utterly wearied you with my scribbling and bad handwriting.

My dear Romanes, yours, very sincerely,

CH. DARWIN.

Postscript of a Letter to Professor A. Agassiz, May 5th,

1881 :—

I read with much interest your address before the American Association. However true your remarks on the genealogies of the several groups may be, I hope and believe that you have over-estimated the difficulties to be encountered in the future :—A few days after reading your address, I interpreted to myself your remarks on one point (I hope in some degree correctly) in the following fashion :—

Any character of an ancient, generalised, or intermediate form may, and often does, re-appear in its descendants, after countless generations, and this explains the extraordinarily complicated affinities of existing groups. This idea seems to me to throw a flood of light on the lines, sometimes used to represent affinities, which radiate in all directions, often to very distant sub-groups,—a difficulty which has haunted me for half a century. A strong case could be made out in favour of believing in such reversion after immense intervals of time. I wish the idea had been put into my head in old days, for I shall never again write on difficult subjects, as I have seen too many cases of old men becoming feeble in

their minds, without being in the least conscious of it. If I have interpreted your ideas at all correctly, I hope that you will re-urge, on any fitting occasion, your view. I have mentioned it to a few persons capable of judging, and it seemed quite new to them. I beg you to forgive the proverbial garrulity of old age.

C. D.

[The following letter refers to Sir J. D. Hooker's Geographical address at the York Meeting (1881) of the British Association :]

C. Darwin to J. D. Hooker.

Down, August 6, 1881.

MY DEAR HOOKER,—For Heaven's sake never speak of boring me, as it would be the greatest pleasure to aid you in the slightest degree and your letter has interested me exceedingly. I will go through your points seriatim, but I have never attended much to the history of any subject, and my memory has become atrociously bad. It will therefore be a mere chance whether any of my remarks are of any use.

Your idea, to show what travellers have done, seems to me a brilliant and just one, especially considering your audience.

1. I know nothing about Tournefort's works.

2. I believe that you are fully right in calling Humboldt the greatest scientific traveller who ever lived, I have lately read two or three volumes again. His Geology is funny stuff; but that merely means that he was not in advance of his age. I should say he was wonderful, more for his near approach to omniscience than for originality. Whether or not his position as a scientific man is as eminent as we think, you might truly call him the parent of a grand progeny of scientific travellers, who, taken together, have done much for science.

3. It seems to me quite just to give Lyell (and secondarily E. Forbes) a very prominent place.

4. Dana was, I believe, the first man who maintained the

permanence of continents and the great oceans. . . . When I read the '*Challenger's*' conclusion that sediment from the land is not deposited at greater distances than 200 to 300 miles from the land, I was much strengthened in my old belief. Wallace seems to me to have argued the case excellently. Nevertheless, I would speak, if I were in your place, rather cautiously; for T. Mellard Reade has argued lately with some force against the view; but I cannot call to mind his arguments. If forced to express a judgment, I should abide by the view of approximate permanence since Cambrian days.

5. The extreme importance of the Arctic fossil-plants, is self-evident. Take the opportunity of groaning over [our] ignorance of the Lignite Plants of Kerguelen Land, or any Antarctic land. It might do good.

6. I cannot avoid feeling sceptical about the travelling of plants from the North *except during the Tertiary period*. It may of course have been so and probably was so from one of the two poles at the earliest period, during Pre-Cambrian ages; but such speculations seem to me hardly scientific seeing how little we know of the old Floras.

I will now jot down without any order a few miscellaneous remarks.

I think you ought to allude to Alph. De Candolle's great book, for though it (like almost everything else) is washed out of my mind, yet I remember most distinctly thinking it a very valuable work. Anyhow, you might allude to his excellent account of the history of all cultivated plants.

How shall you manage to allude to your New Zealand and Tierra del Fuego work? if you do not allude to them you will be scandalously unjust.

The many Angiosperm plants in the Cretaceous beds of the United States (and as far as I can judge the age of these beds has been fairly well made out) seems to me a fact of very great importance, so is their relation to the existing flora of the United States under an Evolutionary point of view.

Have not some Australian extinct forms been lately found in Australia? or have I dreamed it?

Again, the recent discovery of plants rather low down in our Silurian beds is very important.

Nothing is more extraordinary in the history of the Vegetable Kingdom, as it seems to me, than the *apparently* very sudden or abrupt development of the higher plants. I have sometimes speculated whether there did not exist somewhere during long ages an extremely isolated continent, perhaps near the South Pole.

Hence I was greatly interested by a view which Saprota propounded to me, a few years ago, at great length in MS. and which I fancy he has since published, as I urged him to do—viz., that as soon as flower-frequenting insects were developed, during the latter part of the secondary period, an enormous impulse was given to the development of the higher plants by cross-fertilization being thus suddenly formed.

A few years ago I was much struck with Axel Blytt's* Essay showing from observation, on the peat beds in Scandinavia, that there had apparently been long periods with more rain and other with less rain (perhaps connected with Croll's recurrent astronomical periods), and that these periods had largely determined the present distribution of the plants of Norway and Sweden. This seemed to me, a very important essay.

I have just read over my remarks and I fear that they will not be of the slightest use to you.

I cannot but think that you have got through the hardest, or at least the most difficult, part of your work in having made so good and striking a sketch of what you intend to say; but I can quite understand how you must groan over the great necessary labour.

I most heartily sympathise with you on the successes of B. and R.: as years advance what happens to oneself becomes of very little consequence, in comparison with the careers of our children.

* See footnote, p. 392.

Keep your spirits up, for I am convinced that you will make an excellent address.

Ever yours, affectionately,

CHARLES DARWIN.

[In September he wrote :—

“I have this minute finished reading your splendid but too short address. I cannot doubt that it will have been fully appreciated by the Geographers of York; if not, they are asses and fools.”]

C. Darwin to John Lubbock.

Sunday evening [1881].

MY DEAR L.,—Your address* has made me think over what have been the great steps in Geology during the last fifty years, and there can be no harm in telling you my impression. But it is very odd that I cannot remember what you have said on Geology. I suppose that the classification of the Silurian and Cambrian formations must be considered the greatest or most important step; for I well remember when all these older rocks were called grau-wacke, and nobody dreamed of classing them; and now we have three azoic formations pretty well made out beneath the Cambrian! But the most striking step has been the discovery of the Glacial period: you are too young to remember the prodigious effect this produced about the year 1840 (?) on all our minds. Elie de Beaumont never believed in it to the day of his death! the study of the glacial deposits led to the study of the superficial drift, which was formerly *never studied* and called Diluvium, as I well remember. The study under the microscope of rock-sections is another not inconsiderable step. So again the making out of cleavage and the foliation of the metamorphic rocks. But I will not run on, having now eased my mind. Pray do not waste even one minute in acknowledging my horrid scrawls. Ever yours,

CH. DARWIN. **

* Presidential Address at the York meeting of the British Association.

[The following extracts referring to the late Francis Maitland Balfour,* show my father's estimate of his work and intellectual qualities, but they give merely an indication of his strong appreciation of Balfour's most lovable personal character :—

From a letter to Fritz Müller, January 5, 1882 :—

"Your appreciation of Balfour's book ['Comparative Embryology'] has pleased me excessively, for though I could not properly judge of it, yet it seemed to me one of the most remarkable books which have been published for some considerable time. He is quite a young man, and if he keeps his health, will do splendid work. . . . He has a fair fortune of his own, so that he can give up his whole time to Biology. He is very modest, and very pleasant, and often visits here and we like him very much."

From a letter to Dr. Dohrn, February 13, 1882 :—

"I have got one very bad piece of news to tell you, that F. Balfour is very ill at Cambridge with typhoid fever. . . . I hope that he is not in a very dangerous state; but the fever is severe. Good Heavens, what a loss he would be to Science, and to his many loving friends!"]

C. Darwin to T. H. Huxley.

Down, January 12, 1882.

MY DEAR HUXLEY,—Very many thanks for 'Science and Culture,' and I am sure that I shall read most of the essays with much interest. With respect to Automatism,† I wish that you could review yourself in the old, and of course forgotten, trenchant style, and then you would here answer yourself with equal incisiveness; and thus, by Jove, you

* Professor of Animal Morphology at Cambridge. He was born in 1851, and was killed, with his guide, on the Aiguille Blanche, near Courmayeur, in July, 1882.

† "On the hypothesis that animals are automata and its history," an Address given at the Belfast meeting of the British Association, 1874, and published in the 'Fortnightly Review,' 1874, and in 'Science and Culture.'

might go on *ad infinitum*, to the joy and instruction of the world. Ever yours very sincerely,

CHARLES DARWIN.

[The following letter refers to Dr. Ogle's translation of Aristotle, 'On the Parts of Animals' (1882):]

C. Darwin to W. Ogle.

Down, February 22, 1882.

MY DEAR DR. OGLE,—You must let me thank you for the pleasure which the introduction to the Aristotle book has given me. I have rarely read anything which has interested me more, though I have not read as yet more than a quarter of the book proper.

From quotations which I had seen, I had a high notion of Aristotle's merits, but I had not the most remote notion what a wonderful man he was. Linnæus and Cuvier have been my two gods, though in very different ways, but they were mere schoolboys to old Aristotle. How very curious, also, his ignorance on some points, as on muscles as the means of movement. I am glad that you have explained in so probable a manner some of the grossest mistakes attributed to him. I never realized, before reading your book, to what an enormous summation of labour we owe even our common knowledge. I wish old Aristotle could know what a grand Defender of the Faith he had found in you. Believe me, my dear Dr. Ogle,

Yours very sincerely,

CH. DARWIN.

[In February, he received a letter and a specimen from a Mr. W. D. Crick, which illustrated a curious mode of dispersal of bivalve shells, namely, by closure of their valves so as to hold on to the leg of a water-beetle. This class of fact had a special charm for him, and he wrote to 'Nature,' describing the case.*]

* 'Nature,' April 6, 1882.

In April he received a letter from Dr. W. Van Dyck, Lecturer in Zoology at the Protestant College of Beyrout. The letter showed that the street dogs of Beyrout had been rapidly mongrelised by introduced European dogs, and the facts have an interesting bearing on my father's theory of Sexual Selection.]

C. Darwin to W. T. Van Dyck.

Down, April 3, 1882.

DEAR SIR,—After much deliberation, I have thought it best to send your very interesting paper to the Zoological Society, in hopes that it will be published in their Journal. This journal goes to every scientific institution in the world, and the contents are abstracted in all year-books on Zoology. Therefore I have preferred it to 'Nature,' though the latter has a wider circulation, but is ephemeral.

I have prefaced your essay by a few general remarks, to which I hope that you will not object.

Of course I do not know that the Zoological Society, which is much addicted to mere systematic work, will publish your essay. If it does, I will send you copies of your essay, but these will not be ready for some months. If not published by the Zoological Society, I will endeavour to get 'Nature' to publish it. I am very anxious that it should be published and preserved. Dear Sir,

Yours faithfully,

CH. DARWIN.

[The paper was read at a meeting of the Zoological Society on April 18th—the day before my father's death.

The preliminary remarks with which Dr. Van Dyck's paper is prefaced are thus the latest of my father's writings.]

We must now return to an early period of his life, and give a connected account of his botanical work, which has hitherto been omitted.

CHAPTER X.

FERTILISATION OF FLOWERS.

[IN the letters already given we have had occasion to notice the general bearing of a number of botanical problems on the wider question of Evolution. The detailed work in botany which my father accomplished by the guidance of the light cast on the study of natural history by his own work on Evolution remains to be noticed. In a letter to Mr. Murray, September 24th, 1861, speaking of his book on the 'Fertilisation of Orchids,' he says: "It will perhaps serve to illustrate how Natural History may be worked under the belief of the modification of species." This remark gives a suggestion as to the value and interest of his botanical work, and it might be expressed in far more emphatic language without danger of exaggeration.

In the same letter to Mr. Murray, he says: "I think this little volume will do good to the 'Origin,' as it will show that I have worked hard at details." It is true that his botanical work added a mass of corroborative detail to the case for Evolution, but the chief support to his doctrines given by these researches was of another kind. They supplied an argument against those critics who have so freely dogmatised as to the uselessness of particular structures, and as to the consequent impossibility of their having been developed by means of natural selection. His observations on Orchids enabled him to say: "I can show the meaning of some of the apparently meaningless ridges, horns, who will now venture to say that this or that structure is useless?" A kindred point is expressed in a letter to Sir J. D. Hooker (May 14th, 1862):—

“When many parts of structure, as in the woodpecker, show distinct adaptation to external bodies, it is preposterous to attribute them to the effects of climate, &c., but when a single point alone, as a hooked seed, it is conceivable it may thus have arisen. I have found the study of Orchids eminently useful in showing me how nearly all parts of the flower are co-adapted for fertilization by insects, and therefore the results of natural selection—even the most trifling details of structure.”

One of the greatest services rendered by my father to the study of Natural History is the revival of Teleology. The evolutionist studies the purpose or meaning of organs with the zeal of the older Teleology, but with far wider and more coherent purpose. He has the invigorating knowledge that he is gaining not isolated conceptions of the economy of the present, but a coherent view of both past and present. And even where he fails to discover the use of any part, he may, by a knowledge of its structure, unravel the history of the past vicissitudes in the life of the species. In this way a vigour and unity is given to the study of the forms of organised beings, which before it lacked. This point has already been discussed in Mr. Huxley's chapter on the ‘Reception of the *Origin of Species*,’ and need not be here considered. It does, however, concern us to recognize that this “great service to natural science,” as Dr. Gray describes it, was effected almost as much by his special botanical work as by the ‘*Origin of Species*.’

For a statement of the scope and influence of my father's botanical work, I may refer to Mr. Thiselton Dyer's article in ‘Charles Darwin,’ one of the *Nature Series*. Mr. Dyer's wide knowledge, his friendship with my father, and especially his power of sympathising with the work of others, combine to give this essay a permanent value. The following passage (p. 43) gives a true picture :—

“Notwithstanding the extent and variety of his botanical work, Mr. Darwin always disclaimed any right to be regarded as a professed botanist. He turned his attention to plants,

doubtless because they were convenient objects for studying organic phenomena in their least complicated forms; and this point of view, which, if one may use the expression without disrespect, had something of the amateur about it, was in itself of the greatest importance. For, from not being, till he took up any point, familiar with the literature bearing on it, his mind was absolutely free from any prepossession. He was never afraid of his facts, or of framing any hypothesis, however startling, which seemed to explain them. . . . In any one else such an attitude would have produced much work that was crude and rash. But Mr. Darwin—if one may venture on language which will strike no one who had conversed with him as over-strained—seemed by gentle persuasion to have penetrated that reserve of nature which baffles smaller men. In other words, his long experience had given him a kind of instinctive insight into the method of attack of any biological problem, however unfamiliar to him, while he rigidly controlled the fertility of his mind in hypothetical explanations by the no less fertility of ingeniously devised experiment."

To form any just idea of the greatness of the revolution worked by my father's researches in the study of the fertilisation of flowers, it is necessary to know from what a condition this branch of knowledge has emerged. It should be remembered that it was only during the early years of the present century that the idea of sex, as applied to plants, became at all firmly established. Sachs, in his 'History of Botany' (1875), has given some striking illustrations of the remarkable slowness with which its acceptance gained ground. He remarks that when we consider the experimental proofs given by Camerarius (1694), and by Kölreuter (1761-66), it appears incredible that doubts should afterwards have been raised as to the sexuality of plants. Yet he shows that such doubts did actually repeatedly crop up. These adverse criticisms rested for the most part on careless experiments, but in many cases on *à priori* arguments. Even as late as 1820, a book of this kind, which would now rank with circle squaring, or

flat-earth philosophy, was seriously noticed in a botanical journal.

A distinct conception of sex as applied to plants, had not long emerged from the mists of profitless discussion and feeble experiment, at the time when my father began botany by attending Henslow's lectures at Cambridge.

When the belief in the sexuality of plants had become established as an incontrovertible piece of knowledge, a weight of misconception remained, weighing down any rational view of the subject. Camerarius* believed (naturally enough in his day) that hermaphrodite flowers are necessarily self-fertilised. He had the wit to be astonished at this, a degree of intelligence which, as Sachs points out, the majority of his successors did not attain to.

The following extracts from a note-book show that this point occurred to my father as early as 1837:—

“Do not plants which have male and female organs together [*i.e.* in the same flower] yet receive influence from other plants? Does not Lyell give some argument about varieties being difficult to keep [true] on account of pollen from other plants? Because this may be applied to show all plants do receive intermixture.”

Sprengel,† indeed, understood that the hermaphrodite structure of flowers by no means necessarily leads to self-fertilisation. But although he discovered that in many cases pollen is of necessity carried to the stigma of another *flower*, he did not understand that in the advantage gained by the intercrossing of distinct *plants* lies the key to the whole question. Hermann Müller has well remarked that this “omission was for several generations fatal to Sprengel's work. . . . For both at the time and subsequently, botanists felt above all the weakness of his theory, and they set aside, along with his defective ideas, his rich store of patient and acute observations and his comprehensive and accurate interpreta-

* Sachs, ‘Geschichte,’ p. 419.

† Christian Conrad Sprengel, born 1750, died 1816.

tions." It remained for my father to convince the world that the meaning hidden in the structure of flowers was to be found by seeking light in the same direction in which Sprengel, seventy years before, had laboured. Robert Brown was the connecting link between them, for it was at his recommendation that my father in 1841 read Sprengel's now celebrated 'Secret of Nature Displayed.'* The book impressed him as being "full of truth," although "with some little nonsense." It not only encouraged him in kindred speculation, but guided him in his work, for in 1844 he speaks of verifying Sprengel's observations. It may be doubted whether Robert Brown ever planted a more beautiful seed than in putting such a book into such hands.

A passage in the 'Autobiography' (vol. i. p. 73) shows how it was that my father was attracted to the subject of fertilisation: "During the summer of 1839, and I believe during the previous summer, I was led to attend to the cross-fertilisation of flowers by the aid of insects, from having come to the conclusion in my speculations on the origin of species, that crossing played an important part in keeping specific forms constant."

The original connection between the study of flowers and the problem of evolution is curious, and could hardly have been predicted. Moreover, it was not a permanent bond. As soon as the idea arose that the offspring of cross-fertilisation is, in the struggle for life, likely to conquer the seedlings of self-fertilised parentage, a far more vigorous belief in the potency of natural selection in moulding the structure of flowers is attained. A central idea is gained towards which experiment and observation may be directed.

Dr. Gray has well remarked with regard to this central

* 'Das entdeckte Geheimniss der Natur im Baue und in der Befruchtung der Blumen.' Berlin, 1793.

idea ('Nature,' June 4, 1874):—"The aphorism, 'Nature abhors a vacuum,' is a characteristic specimen of the science of the middle ages. The aphorism, 'Nature abhors close fertilisation,' and the demonstration of the principle, belong to our age and to Mr. Darwin. To have originated this, and also the principle of Natural Selection . . . and to have applied these principles to the system of nature, in such a manner as to make, within a dozen years, a deeper impression upon natural history than has been made since Linnæus, is ample title for one man's fame."

The flowers of the Papilionaceæ attracted his attention early, and were the subject of his first paper on fertilisation.* The following extract from an undated letter to Dr. Asa Gray seems to have been written before the publication of this paper, probably in 1856 or 1857:—

". . . . What you say on Papilionaceous flowers is very true; and I have no facts to show that varieties are crossed; but yet (and the same remark is applicable in a beautiful way to *Fumaria* and *Dielytra*, as I noticed many years ago), I must believe that the flowers are constructed partly in direct relation to the visits of insects; and how insects can avoid bringing pollen from other individuals I cannot understand. It is really pretty to watch the action of a Humble-bee on the scarlet kidney bean, and in this genus (and in *Lathyrus grandiflorus*) the honey is so placed that the bee invariably alights on that *one* side of the flower towards which the spiral pistil is protruded (bringing out with it pollen), and by the depression of the wing-petal is forced against the bee's side all dusted with pollen.† In the broom the pistil is rubbed on the centre of the back of the bee. I suspect there is some-

* *Gardeners' Chronicle*, 1857, p. 725. It appears that this paper was a piece of "over-time" work. He wrote to a friend, "that confounded leguminous paper was done in the afternoon, and the consequence was I had to go to Moor Park for a week."

† If you will look at a bed of scarlet kidney beans you will find that the wing-petals on the *left* side alone are all scratched by the tarsi of the bees. [Note in the original letter by C. Darwin.]

thing to be made out about the Leguminosæ, which will bring the case within *our* theory ; though I have failed to do so. Our theory will explain why in the vegetable and animal kingdom the act of fertilisation even in hermaphrodites usually takes place *sub-jove*, though thus exposed to *great* injury from damp and rain. In animals which cannot be [fertilised] by insects or wind, there is *no case* of *land*-animals being hermaphrodite without the concourse of two individuals."

A letter to Dr. Asa Gray (Sept. 5th, 1857) gives the substance of the paper in the *Gardeners' Chronicle* :—

"Lately I was led to examine buds of kidney bean with the pollen shed ; but I was led to believe that the pollen could *hardly* get on the stigma by wind or otherwise, except by bees visiting [the flower] and moving the wing petals : hence I included a small bunch of flowers in two bottles in every way treated the same : the flowers in one I daily just momentarily moved, as if by a bee ; these set three fine pods, the other *not one*. Of course this little experiment must be tried again, and this year in England it is too late, as the flowers seem now seldom to set. If bees are necessary to this flower's self-fertilisation, bees must almost cross them, as their dusted right-side of head and right legs constantly touch the stigma.

"I have, also, lately been re-observing daily *Lobelia fulgens*—this in my garden is never visited by insects, and never sets seeds, without pollen be put on the stigma (whereas the small blue *Lobelia* is visited by bees and does set seed) ; I mention this because there are such beautiful contrivances to prevent the stigma ever getting its own pollen ; which seems only explicable on the doctrine of the advantage of crosses."

The paper was supplemented by a second in 1858.* The chief object of these publications seems to have been to obtain

* *Gardeners' Chronicle*, 1858, p. 828. In 1861 another paper on Fertilisation appeared in the *Gardeners' Chronicle*, p. 552, in which he explained the action of insects on *Vinca major*. He was attracted to the periwinkle by the fact that it is not visited by insects and never sets seeds.

information as to the possibility of growing varieties of leguminous plants near each other, and yet keeping them true. It is curious that the Papilionaceæ should not only have been the first flowers which attracted his attention by their obvious adaptation to the visits of insects, but should also have constituted one of his sorest puzzles. The common pea and the sweet pea gave him much difficulty, because, although they are as obviously fitted for insect-visits as the rest of the order, yet their varieties keep true. The fact is that neither of these plants being indigenous, they are not perfectly adapted for fertilisation by British insects. He could not, at this stage of his observations, know that the co-ordination between a flower and the particular insect which fertilises it may be as delicate as that between a lock and its key, so that this explanation was not likely to occur to him.*

Besides observing the Leguminosæ, he had already begun, as shown in the foregoing extracts, to attend to the structure of other flowers in relation to insects. At the beginning of 1860 he worked at *Leschenaultia*,† which at first puzzled him, but was ultimately made out. A passage in a letter chiefly relating to *Leschenaultia* seems to show that it was only in the spring of 1860 that he began widely to apply his knowledge to the relation of insects to other flowers. This is somewhat surprising, when we remember that he had read Sprengel many years before. He wrote (May 14) :—

“I should look at this curious contrivance as specially related to visits of insects; as I begin to think is almost universally the case.”

Even in July 1862 he wrote to Dr. Asa Gray :—

“There is no end to the adaptations. Ought not these cases to make one very cautious when one doubts about the

* He was of course alive to variety in the habits of insects. He published a short note in the *Entomologists Weekly Intelligencer*, 1860, asking whether the *Tineina* and other small moths suck flowers.

† He published a short paper on the manner of fertilisation of this flower, in the *Gardeners' Chronicle*, 1871, p. 1166.

use of all parts? I fully believe that the structure of all irregular flowers is governed in relation to insects. Insects are the Lords of the floral (to quote the witty *Athenæum*) world."

He was probably attracted to the study of Orchids by the fact that several kinds are common near Down. The letters of 1860 show that these plants occupied a good deal of his attention; and in 1861 he gave part of the summer and all the autumn to the subject. He evidently considered himself idle for wasting time on Orchids, which ought to have been given to 'Variation under Domestication.' Thus he wrote:—

"There is to me incomparably more interest in observing than in writing; but I feel quite guilty in trespassing on these subjects, and not sticking to varieties of the confounded cocks, hens and ducks. I hear that Lyell is savage at me. I shall never resist *Linum* next summer."

It was in the summer of 1860 that he made out one of the most striking and familiar facts in the book, namely, the manner in which the pollen masses in *Orchis* are adapted for removal by insects. He wrote to Sir J. D. Hooker July 12:—

"I have been examining *Orchis pyramidalis*, and it almost equals, perhaps even beats, your *Listera* case; the sticky glands are congenitally united into a saddle-shaped organ, which has great power of movement, and seizes hold of a bristle (or proboscis) in an admirable manner, and then another movement takes place in the pollen masses, by which they are beautifully adapted to leave pollen on the two *lateral* stigmatic surfaces. I never saw anything so beautiful."

In June of the same year he wrote:—

"You speak of adaptation being rarely *visible*, though present in plants. I have just recently been looking at the common *Orchis*, and I declare I think its adaptations in every part of the flower quite as beautiful and plain, or even more beautiful than in the Woodpecker. I have written and

sent a notice for the *Gardeners' Chronicle*,* on a curious difficulty in the Bee Orchis, and should much like to hear what you think of the case. In this article I have incidentally touched on adaptation to visits of insects; but the contrivance to keep the sticky glands fresh and sticky beats almost everything in nature. I never remember having seen it described, but it must have been, and, as I ought not in my book to give the observation as my own, I should be very glad to know where this beautiful contrivance is described."

He wrote also to Dr. Gray, June 8, 1860 :—

"Talking of adaptation, I have lately been looking at our common orchids, and I dare say the facts are as old and well-known as the hills, but I have been so struck with admiration at the contrivances, that I have sent a notice to the *Gardeners' Chronicle*. The *Ophrys apifera*, offers, as you will see, a curious contradiction in structure."

Besides attending to the fertilisation of the flowers he was already, in 1860, busy with the homologies of the parts, a subject of which he made good use in the Orchid book. He wrote to Sir Joseph Hooker (July) :—

"It is a real good joke my discussing homologies of Orchids with you, after examining only three or four genera; and this very fact makes me feel positive I am right! I do not quite understand some of your terms; but sometime I must get you to explain the homologies; for I am intensely interested on the subject, just as at a game of chess."

This work was valuable from a systematic point of view. In 1880 he wrote to Mr. Bentham :—

"It was very kind in you to write to me about the Orchideæ, for it has pleased me to an extreme degree that I could have been of the *least* use to you about the nature of the parts."

The pleasure which his early observations on Orchids gave

* June 9, 1860. This seems to have attracted some attention, especially among entomologists, as it was reprinted in the *Entomologists Weekly Intelligencer*, 1860.

him is shown in such extracts as the following from a letter to Sir J. D. Hooker (July 27, 1861) :—

“You cannot conceive how the Orchids have delighted me. They came safe, but box rather smashed; cylindrical old cocoa- or snuff-canister much safer. I enclose postage. As an account of the movement, I shall allude to what I suppose is *Oncidium*, to make *certain*,—is the enclosed flower with crumpled petals this genus? Also I most specially want to know what the enclosed little globular brown Orchid is. I have only seen pollen of a *Cattleya* on a bee, but surely have you not unintentionally sent me what I wanted most (after *Catasetum* or *Mormodes*), viz. one of the *Epidendreae*? I *particularly* want (and will presently tell you why) another spike of this little Orchid, with older flowers, some even almost withered.”

His delight in observation is again shown in a letter to Dr. Gray (1863). Referring to Crüger's letters from Trinidad, he wrote :—“Happy man, he has actually seen crowds of bees flying round *Catasetum*, with the pollinia sticking to their backs!”

The following extracts of letters to Sir J. D. Hooker illustrate further the interest which his work excited in him :—

“Veitch sent me a grand lot this morning. What wonderful structures!”

“I have now seen enough, and you must not send me more, for though I enjoy looking at them *much*, and it has been very useful to me, seeing so many different forms, it is idleness. For my object each species requires studying for days. I wish you had time to take up the group. I would give a good deal to know what the rostellum is, of which I have traced so many curious modifications. I suppose it cannot be one of the stigmas,* there seems a great tendency for two lateral stigmas to appear. My paper, though touching on only subordinate points will run, I fear, to 100 MS. folio pages! The beauty of the adaptation of parts seems

* It is a modification of the upper stigma.

to me unparalleled. I should think or guess waxy pollen was most differentiated. In *Cypripedium* which seems least modified, and a much exterminated group, the grains are single. In *all others*, as far as I have seen, they are in packets of four; and these packets cohere into many wedge-formed masses in *Orchis*; into eight, four, and finally two. It seems curious that a flower should exist, which could *at most* fertilise only two other flowers, seeing how abundant pollen generally is; this fact I look at as explaining the perfection of the contrivance by which the pollen, so important from its fewness, is carried from flower to flower" (1861).

"I was thinking of writing to you to-day, when your note with the *Orchids* came. What frightful trouble you have taken about *Vanilla*; you really must not take an atom more; for the *Orchids* are more play than real work. I have been much interested by *Epidendrum*, and have worked all morning at them; for heaven's sake, do not corrupt me by any more" (August 30, 1861).

He originally intended to publish his notes on *Orchids* as a paper in the Linnean Society's Journal, but it soon became evident that a separate volume would be a more suitable form of publication. In a letter to Sir J. D. Hooker, Sept. 24, 1861, he writes:—

"I have been acting, I fear that you will think, like a goose; and perhaps in truth I have. When I finished a few days ago my *Orchis* paper, which turns out 140 folio pages!! and thought of the expense of woodcuts, I said to myself, I will offer the Linnean Society to withdraw it, and publish it in a pamphlet. It then flashed on me that perhaps Murray would publish it, so I gave him a cautious description, and offered to share risks and profits. This morning he writes that he will publish and take all risks, and share profits and pay for all illustrations. It is a risk, and heaven knows whether it will not be a dead failure, but I have not deceived Murray, and [have] told him that it would interest those alone who cared much for natural history. I hope I do not exaggerate the curiosity of the many special contrivances."

He wrote the two following letters to Mr. Murray about the publication of the book :]

Down, Sept. 21 [1861].

MY DEAR SIR,—Will you have the kindness to give me your opinion, which I shall implicitly follow. I have just finished a very long paper intended for Linnean Society (the title is enclosed), and yesterday for the first time it occurred to me that *possibly* it might be worth publishing separately which would save me trouble and delay. The facts are new, and have been collected during twenty years and strike me as curious. Like a Bridgewater treatise, the chief object is to show the perfection of the many contrivances in Orchids. The subject of propagation is interesting to most people, and is treated in my paper so that any woman could read it. Parts are dry and purely scientific; but I think my paper would interest a good many of such persons who care for Natural History, but no others.

. . . It would be a very little book, and I believe you think very little books objectionable. I have myself *great* doubts on the subject. I am very apt to think that my geese are swans; but the subject seems to me curious and interesting.

I beg you not to be guided in the least in order to oblige me, but as far as you can judge, please give me your opinion. If I were to publish separately, I would agree to any terms, such as half risk and half profit, or what you liked; but I would not publish on my sole risk, for to be frank, I have been told that no publisher whatever, under such circumstances, cares for the success of a book.

C. Darwin to J. Murray.

Down, Sept. 24 [1861].

MY DEAR SIR,—I am very much obliged for your note and very liberal offer. I have had some qualms and fears. All that I can feel sure of is that the MS. contains many new and curious facts, and I am sure the Essay would have interested me, and will interest those who feel lively interest in the

wonders of nature ; but how far the public will care for such minute details, I cannot at all tell. It is a bold experiment ; and at worst, cannot entail much loss ; as a certain amount of sale will, I think, be pretty certain. A large sale is out of the question. As far as I can judge, generally the points which interest me I find interest others ; but I make the experiment with fear and trembling,—not for my own sake, but for yours. . . .

[On Sept. 28th he wrote to Sir J. D. Hooker :—

“What a good soul you are not to sneer at me, but to pat me on the back. I have the greatest doubt whether I am not going to do, in publishing my paper, a most ridiculous thing. It would annoy me much, but only for Murray’s sake, if the publication were a dead failure.”

There was still much work to be done, and in October he was still receiving Orchids from Kew, and wrote to Hooker :—

“It is impossible to thank you enough. I was almost mad at the wealth of Orchids.” And again—

“Mr. Veitch most generously has sent me two splendid buds of *Mormodes*, which will be capital for dissection, but I fear will never be irritable ; so for the sake of charity and love of heaven do, I beseech you, observe what movement takes place in *Cychnoches*, and what part must be touched. Mr. V. has also sent me one splendid flower of *Catasetum*, the most wonderful Orchid I have seen.”

On Oct. 13th he wrote to Sir Joseph Hooker :—

“It seems that I cannot exhaust your good nature. I have had the hardest day’s work at *Catasetum* and buds of *Mormodes*, and believe I understand at last the mechanism of movements and the functions. *Catasetum* is a beautiful case of slight modification of structure leading to new functions. I never was more interested in any subject in my life than in this of Orchids. I owe very much to you.”

Again to the same friend, Nov. 1, 1861 :—

"If you really can spare another *Catasetum*, when nearly ready, I shall be most grateful; had I not better send for it? The case is truly marvellous; the (so-called) sensation, or stimulus from a light touch is certainly transmitted through the antennæ for more than one inch *instantaneously*. . . . A cursed insect or something let my last flower off last night."

Professor de Candolle has remarked * of my father, "Ce n'est pas lui qui aurait demandé de construire des palais pour y loger des laboratoires." This was singularly true of his orchid work, or rather it would be nearer the truth to say that he had no laboratory, for it was only after the publication of the 'Fertilisation of Orchids,' that he built himself a greenhouse. He wrote to Sir J. D. Hooker (Dec. 24th, 1862):—

"And now I am going to tell you a *most* important piece of news!! I have almost resolved to build a small hot-house; my neighbour's really first-rate gardener has suggested it, and offered to make me plans, and see that it is well done, and he is really a clever fellow, who wins lots of prizes, and is very observant. He believes that we should succeed with a little patience; it will be a grand amusement for me to experiment with plants."

Again he wrote (Feb. 15th, 1863):—

"I write now because the new hot-house is ready, and I long to stock it, just like a schoolboy. Could you tell me pretty soon what plants you can give me; and then I shall know what to order? And do advise me how I had better get such plants as you can *spare*. Would it do to send my tax-cart early in the morning, on a day that was not frosty, lining the cart with mats, and arriving here before night? I have no idea whether this degree of exposure (and of course the cart would be cold) could injure stove-plants; they would be about five hours (with bait) on the journey home."

A week later he wrote:—

"You cannot imagine what pleasure your plants give me

* 'Darwin considéré, &c.,' 'Archives des Sciences Physiques et Naturelles,' 3ème période. Tome vii. 481, 1882 (May).

(far more than your dead Wedgwood ware can give you); and I go and gloat over them, but we privately confessed to each other, that if they were not our own, perhaps we should not see such transcendent beauty in each leaf."

And in March, when he was extremely unwell he wrote:—

"A few words about the Stove-plants; they do so amuse me. I have crawled to see them two or three times. Will you correct and answer, and return enclosed. I have hunted in all my books and cannot find these names,* and I like much to know the family."

The book was published May 15th, 1862. Of its reception he writes to Murray, June 13th and 18th:—

"The Botanists praise my Orchid-book to the skies. Some one sent me (perhaps you) the 'Parthenon,' with a good review. The *Athenæum*† treats me with very kind pity and contempt; but the reviewer knew nothing of his subject."

"There is a superb, but I fear exaggerated, review in the 'London Review.'‡ But I have not been a fool, as I thought I was, to publish;§ for Asa Gray, about the most competent judge in the world, thinks almost as highly of the book as does the 'London Review.' The *Athenæum* will hinder the sale greatly."

The Rev. M. J. Berkeley was the author of the notice in the 'London Review,' as my father learned from Sir J. D.

* His difficulty with regard to the names of plants is illustrated, with regard to a Lupine on which he was at work, in an extract from a letter (July 21, 1866) to Sir J. D. Hooker: "I sent to the nursery garden, whence I bought the seed, and could only hear that it was 'the common blue Lupine,' the man saying 'he was no scholard, and did not know Latin, and that parties who make experiments ought to find out the names.'"

† May 24, 1862.

‡ June 14, 1862.

§ Doubts on this point still, however, occurred to him about this time. He wrote to Prof. Oliver (June 8): "I am glad that you have read my Orchis-book and seem to approve of it; for I never published anything which I so much doubted whether it was worth publishing, and indeed I still doubt. The subject interested me beyond what, I suppose, it is worth."

Hooker, who added, "I thought it very well done indeed. I have read a good deal of the Orchid-book, and echo all he says."

To this my father replied (June 30th, 1862):—

"MY DEAR OLD FRIEND,—You speak of my warming the cockles of your heart, but you will never know how often you have warmed mine. It is not your approbation of my scientific work (though I care for that more than for any one's): it is something deeper. To this day I remember keenly a letter you wrote to me from Oxford, when I was at the Water-cure, and how it cheered me when I was utterly weary of life. Well, my Orchis-book is a success (but I do not know whether it sells)."

In another letter to the same friend, he wrote:—

"You have pleased me much by what you say in regard to Bentham and Oliver approving of my book; for I had got a sort of nervousness, and doubted whether I had not made an egregious fool of myself, and concocted pleasant little stinging remarks for reviews, such as 'Mr. Darwin's head seems to have been turned by a certain degree of success, and he thinks that the most trifling observations are worth publication.'"

Mr. Bentham's approval was given in his Presidential Address to the Linnean Society, May 24, 1862, and was all the more valuable because it came from one who was by no means supposed to be favourable to evolutionary doctrines.]

C. Darwin to Asa Gray.

Down, June 10 [1862].

MY DEAR GRAY,—Your generous sympathy makes you overestimate what you have read of my Orchid-book. But your letter of May 18th and 26th has given me an almost foolish amount of satisfaction. The subject interested me, I knew, beyond its real value; but I had lately got to think that I had made myself a complete fool by publishing in a semi-popular form. Now I shall confidently defy the world.

I have heard that Bentham and Oliver approve of it; but I have heard the opinion of no one else whose opinion is worth a farthing. . . . No doubt my volume contains much error: how curiously difficult it is to be accurate, though I try my utmost. Your notes have interested me beyond measure. I can now afford to d— my critics with ineffable complacency of mind. Cordial thanks for this benefit. It is surprising to me that you should have strength of mind to care for science, amidst the awful events daily occurring in your country. I daily look at the *Times* with almost as much interest as an American could do. When will peace come? it is dreadful to think of the desolation of large parts of your magnificent country; and all the speechless misery suffered by many. I hope and think it not unlikely that we English are wrong in concluding that it will take a long time for prosperity to return to you. It is an awful subject to reflect on. . . .

[Dr. Asa Gray reviewed the book in 'Silliman's Journal,'* where he speaks, in strong terms, of the fascination which it must have for even slightly instructed readers. He made, too, some original observations on an American orchid, and these first-fruits of the subject, sent in MS. or proof sheet to my father, were welcomed by him in a letter (July 23rd):—

"Last night, after writing the above, I read the great bundle of notes. Little did I think what I had to read. What admirable observations! You have distanced me on my own hobby-horse! I have not had for weeks such a glow of pleasure as your observations gave me."

The next letter refers to the publication of the review:]

* 'Silliman's Journal,' vol. xxiv. p. 138. Here is given an account of the fertilisation of *Platanthera Hookeri*. *P. hyperborea* is discussed in Dr. Gray's 'Enumeration' in the same volume, p. 259; also, with other species, in a second notice of the Orchid-book at p. 420.

C. Darwin to Asa Gray.

Down, July 28 [1862].

MY DEAR GRAY,—I hardly know what to thank for first. Your stamps gave infinite satisfaction. I took him * first one lot, and then an hour afterwards another lot. He actually raised himself on one elbow to look at them. It was the first animation he showed. He said only: "You must thank Professor Gray awfully." In the evening after a long silence, there came out the oracular sentence: "He is awfully kind." And indeed you are, overworked as you are, to take so much trouble for our poor dear little man.—And now I must begin the "awfullys" on my own account: what a capital notice you have published on the orchids! It could not have been better; but I fear that you overrate it. I am very sure that I had not the least idea that you or any one would approve of it so much. I return your last note for the chance of your publishing any notice on the subject; but after all perhaps you may not think it worth while; yet in my judgment *several* of your facts, especially *Platanthera hyperborea*, are *much* too good to be merged in a review. But I have always noticed that you are prodigal in originality in your reviews. . . .

[Sir Joseph Hooker reviewed the book in the *Gardeners' Chronicle*, writing in a successful imitation of the style of Lindley, the Editor. My father wrote to Sir Joseph (Nov. 12, 1862):—

"So you did write the review in the *Gardeners' Chronicle*. Once or twice I doubted whether it was Lindley; but when I came to a little slap at R. Brown, I doubted no longer. You arch-rogue! I do not wonder you have deceived others also. Perhaps I am a conceited dog; but if so, you have much to answer for; I never received so much praise, and coming from you I value it much more than from any other."

With regard to botanical opinion generally, he wrote to

* One of his boys who was ill.

Dr. Gray, "I am fairly astonished at the success of my book with botanists." Among naturalists who were not botanists, Lyell was pre-eminent in his appreciation of the book. I have no means of knowing when he read it, but in later life, as I learn from Professor Judd, he was enthusiastic in praise of the 'Fertilisation of Orchids,' which he considered "next to the 'Origin,' as the most valuable of all Darwin's works." Among the general public the author did not at first hear of many disciples, thus he wrote to his cousin Fox in September 1862: "Hardly any one not a botanist, except yourself, as far as I know, has cared for it."

A favourable notice appeared in the *Saturday Review*, October 18th, 1862; the reviewer points out that the book would escape the angry polemics aroused by the 'Origin.'* This is illustrated by a review in the *Literary Churchman*, in which only one fault found, namely, that Mr. Darwin's expression of admiration at the contrivances in orchids is too indirect a way of saying, "O Lord, how manifold are Thy works!"

A somewhat similar criticism occurs in the 'Edinburgh Review' (October 1862). The writer points out that Mr. Darwin constantly uses phrases, such as "beautiful contrivance," "the labellum is . . . *in order* to attract," "the nectar is *purposely* lodged." The Reviewer concludes his discussion thus: "We know, too, that these purposes and ideas are not our own, but the ideas and purposes of Another."

The 'Edinburgh' reviewer's treatment of this subject was criticised in the *Saturday Review*, November 15th, 1862: With reference to this article my father wrote to Sir Joseph Hooker (December 29th, 1862):—

"Here is an odd chance; my nephew Henry Parker, an Oxford Classic, and Fellow of Oriel, came here this evening;

* Dr. Gray pointed out that if the Orchid-book (with a few trifling omissions) had appeared before the 'Origin,' the author would have been canonised rather than anathematised by the natural theologians.

and I asked him whether he knew who had written the little article in the *Saturday*, smashing the [Edinburgh reviewer], which we liked ; and after a little hesitation he owned he had. I never knew that he wrote in the *Saturday* ; and was it not an odd chance ? ”

The ‘Edinburgh’ article was written by the Duke of Argyll, and has since been made use of in his ‘Reign of Law,’ 1867. Mr. Wallace replied * to the Duke’s criticisms, making some specially good remarks on those which refer to orchids. He shows how, by a “beautiful self-acting adjustment,” the nectary of the orchid *Angræcum* (from 10 to 14 inches in length), and the proboscis of a moth sufficiently long to reach the nectar, might be developed by natural selection. He goes on to point out that on any other theory we must suppose that the flower was created with an enormously long nectary, and that then by a special act, an insect was created fitted to visit the flower, which would otherwise remain sterile. With regard to this point my father wrote (October 12 or 13, 1867) :—

“I forgot to remark how capitally you turn the tables on the Duke, when you make him create the *Angræcum* and Moth by special creation.”

If we examine the literature relating to the fertilisation of flowers, we do not find that this new branch of study showed any great activity immediately after the publication of the *Orchid-book*. There are a few papers by Asa Gray, in 1862 and 1863, by Hildebrand in 1864, and by Moggridge in 1865, but the great mass of work by Axell, Delpino, Hildebrand, and the Müllers, did not begin to appear until about 1867. The period during which the new views were being assimilated, and before they became thoroughly fruitful, was, however, surprisingly short. The later activity in this department may be roughly gauged by the fact that the valuable ‘Bibliography,’ given by Prof. D’Arcy Thompson in his translation

* ‘Quarterly Journal of Science,’ October 1867. Republished in ‘Natural Selection,’ 1871.

of Müller's 'Befruchtung' (1883), contains references to 814 papers.

Besides the book on Orchids, my father wrote two or three papers on the subject, which will be found mentioned in the Appendix. The earliest of these, on the three sexual forms of *Catasetum*, was published in 1862; it is an anticipation of part of the Orchid-book, and was merely published in the Linnean Society's Journal, in acknowledgment of the use made of a specimen in the Society's possession. The possibility of apparently distinct species being merely sexual forms of a single species, suggested a characteristic experiment, which is alluded to in the following letter to one of his earliest disciples in the study of the fertilisation of flowers :]

*C. Darwin to J. Traherne Moggridge.**

Down, October 13 [1865].

MY DEAR SIR,—I am especially obliged to you for your beautiful plates and letter-press; for no single point in natural history interests and perplexes me so much as the self-fertilisation† of the Bee-orchis. You have already thrown some light on the subject, and your present observations promise to throw more.

I formed two conjectures: first, that some insect during certain seasons might cross the plants, but I have almost given up this; nevertheless, pray have a look at the flowers next season. Secondly, I conjectured that the Spider and Bee-orchids might be a crossing and self-fertile form of the same species. Accordingly I wrote some years ago to an acquaintance, asking him to mark some Spider-orchids, and observe

* The late Mr. Moggridge, author of 'Harvesting Ants and Trap-door Spiders,' 'Flora of Mentone,' &c.

† He once remarked to Dr. Norman Moore that one of the things that made him wish to live a few thousand years, was his desire to see the extinction of the Bee-orchis,—an end to which he believed its self-fertilising habit was leading.

whether they retained the same character ; but he evidently thought the request as foolish as if I had asked him to mark one of his cows with a ribbon, to see if it would turn next spring into a horse. Now will you be so kind as to tie a string round the stem of a half-a-dozen Spider-orchids, and when you leave Mentone dig them up, and I would try and cultivate them and see if they kept constant ; but I should require to know in what sort of soil and situations they grow. It would be indispensable to mark the plant so that there could be no mistake about the individual. It is also just possible that the same plant would throw up, at different seasons different flower-scapes, and the marked plants would serve as evidence.

With many thanks, my dear sir,

Yours sincerely,

CH. DARWIN.

P.S.—I send by this post my paper on climbing plants, parts of which you might like to read.

[Sir Thomas Farrer and Dr. W. Ogle were also guided and encouraged by my father in their observations. The following refers to a paper by Sir Thomas Farrer, in the 'Annals and Magazine of Natural History,' 1868, on the fertilisation of the Scarlet Runner :]

C. Darwin to T. H. Farrer.

Down, Sept. 15, 1868.

MY DEAR MR. FARRER,—I grieve to say that the *main* features of your case are known. I am the sinner and described them some ten years ago. But I overlooked many details, as the appendage to the single stamen, and several other points. I send my notes, but I must beg for their return, as I have *no other copy*. I quite agree, the facts are most striking, especially as you put them. Are you sure that the Hive-bee is the cutter? it is against my experience. If sure, make the point more prominent, or if not sure, erase it. I do not think the subject is quite new enough for the Lin-

nean Society; but I dare say the 'Annals and Magazine of Natural History,' or *Gardeners' Chronicle* would gladly publish your observations, and it is a great pity they should be lost. If you like I would send your paper to either quarter with a note. In this case you must give a title, and your name, and perhaps it would be well to premise your remarks with a line of reference to my paper stating that you had observed independently and more fully.

I have read my own paper over after an interval of several years, and am amused at the caution with which I put the case that the final end was for crossing distinct individuals, of which I was then as fully convinced as now, but I knew that the doctrine would shock all botanists. Now the opinion is becoming familiar.

To see penetration of pollen-tubes is not difficult, but in most cases requires some practice with dissecting under a one-tenth of an inch focal distance single lens; and just at first this will seem to you extremely difficult.

What a capital observer you are—a first-rate Naturalist has been sacrificed, or partly sacrificed to Public life.

Believe me, yours very sincerely,

CH. DARWIN.

P.S.—If you come across any large *Salvia*, look at it—the contrivance is admirable. It went to my heart to tell a man who came here a few weeks ago with splendid drawings and MS. on *Salvia*, that the work had been all done in Germany.*

[The following extract is from a letter, November 26th, 1868, to Sir Thomas Farrer, written as I learn from him, "in answer to a request for some advice as to the best modes of observation."

* Dr. W. Ogle, the observer of the fertilisation of *Salvia* here alluded to, published his results in the 'Pop. Science Review,' 1869.

He refers both gracefully and gratefully to his relationship with my father in the introduction to his translation of Kerner's 'Flowers and their Unbidden Guests.'

"In my opinion the best plan is to go on working and making copious notes, without much thought of publication, and then if the results turn out striking publish them. It is my impression, but I do not feel sure that I am right, that the best and most novel plan would be, instead of describing the means of fertilisation in particular plants, to investigate the part which certain structures play with all plants or throughout certain orders; for instance, the brush of hairs on the style, or the diadelphous condition of the stamens, in the Leguminosæ, or the hairs within the corolla, &c. &c. Looking to your note, I think that this is perhaps the plan which you suggest.

"It is well to remember that Naturalists value observations far more than reasoning; therefore your conclusions should be as often as possible fortified by noticing how insects actually do the work."

In 1869, Sir Thomas Farrer corresponded with my father on the fertilisation of *Passiflora* and of *Tacsonia*. He has given me his impressions of the correspondence:—

"I had suggested that the elaborate series of *chevaux-de-frise*, by which the nectary of the common *Passiflora* is guarded, were specially calculated to protect the flower from the stiff-beaked humming birds which would not fertilise it, and to facilitate the access of the little proboscis of the humble bee, which would do so; whilst, on the other hand, the long pendent tube and flexible valve-like corona which retains the nectar of *Tacsonia* would shut out the bee, which would not, and admit the humming bird which would, fertilise that flower. The suggestion is very possibly worthless, and could only be verified or refuted by examination of flowers in the countries where they grow naturally. . . . What interested me was to see that on this as on almost any other point of detailed observation, Mr. Darwin could always say, 'Yes; but at one time I made some observations myself on this particular point; and I think you will find, &c. &c.' That he should after years of interval remember that he had noticed the peculiar structure to which I was referring in the

Passiflora princeps struck me at the time as very remarkable."

With regard to the spread of a belief in the adaptation of flowers for cross-fertilisation, my father wrote to Mr. Bentham April 22, 1868 :

"Most of the criticisms which I sometimes meet with in French works against the frequency of crossing, I am certain are the result of mere ignorance. I have never hitherto found the rule to fail that when an author describes the structure of a flower as specially adapted for self-fertilisation, it is really adapted for crossing. The Fumariaceæ offer a good instance of this, and Treviranus threw this order in my teeth ; but in *Corydalis*, Hildebrand shows how utterly false the idea of self-fertilisation is. This author's paper on *Salvia* is really worth reading, and I have observed some species, and know that he is accurate."

The next letter refers to Professor Hildebrand's paper on *Corydalis*, published in the 'Proc. Internat. Hort. Congress,' London, 1866, and in Pringsheim's 'Jahrbücher,' vol. v. The memoir on *Salvia* alluded to is contained in the previous volume of the same Journal :]

*C. Darwin to F. Hildebrand.**

Down, May 16 [1866].

MY DEAR SIR,—The state of my health prevents my attending the Hort. Congress ; but I forwarded yesterday your paper to the secretary, and if they are not overwhelmed with papers, yours will be gladly received. I have made many observations on the Fumariaceæ, and convinced myself that they were adapted for insect agency ; but I never observed anything nearly so curious as your most interesting facts. I hope you will repeat your experiments on the *Corydalis* on a larger scale, and especially on several distinct plants ; for your plant might have been individually peculiar, like certain indi-

* Professor of Botany at Freiburg.

vidual plants of *Lobelia*, &c., described by Gartner, and of *Passiflora* and Orchids described by Mr. Scott. . . .

Since writing to you before, I have read your admirable memoir on *Salvia*, and it has interested me almost as much as when I first investigated the structure of Orchids. Your paper illustrates several points in my 'Origin of Species,' especially the transition of organs. Knowing only two or three species in the genus, I had often marvelled how one cell of the anther could have been transformed into the movable plate or spoon; and how well you show the gradations; but I am surprised that you did not more strongly insist on this point.

I shall be still more surprised if you do not ultimately come to the same belief with me, as shown by so many beautiful contrivances, that all plants require, from some unknown cause, to be occasionally fertilized by pollen from a distinct individual. With sincere respect, believe me, my dear Sir,

Yours very faithfully,

CH. DARWIN.

[The following letter refers to the late Hermann Müller's 'Befruchtung der Blumen,' by far the most valuable of the mass of literature originating in the 'Fertilisation of Orchids.' An English translation, by Prof. D'Arcy Thompson was published in 1883. My father's "Prefatory Notice" to this work is dated February 6, 1882, and is therefore almost the last of his writings :]

C. Darwin to H. Müller.

Down, May 5, 1873.

MY DEAR SIR,—Owing to all sorts of interruptions and to my reading German so slowly, I have read only to p. 88 of your book; but I must have the pleasure of telling you how very valuable a work it appears to me. Independently of the many original observations, which of course form the most important part, the work will be of the highest use as a means of reference to all that has been done on the subject. I am

fairly astonished at the number of species of insects, the visits of which to different flowers you have recorded. You must have worked in the most indefatigable manner. About half a year ago the editor of 'Nature' suggested that it would be a grand undertaking if a number of naturalists were to do what you have already done on so large a scale with respect to the visits of insects. I have been particularly glad to read your historical sketch, for I had never before seen all the references put together. I have sometimes feared that I was in error when I said that C. K. Sprengel did not fully perceive that cross-fertilisation was the final end of the structure of flowers; but now this fear is relieved, and it is a great satisfaction to me to believe that I have aided in making his excellent book more generally known. Nothing has surprised me more than to see in your historical sketch how much I myself have done on the subject, as it never before occurred to me to think of all my papers as a whole. But I do not doubt that your generous appreciation of the labours of others has led you to over-estimate what I have done. With very sincere thanks and respect, believe me,

Yours faithfully,

CHARLES DARWIN.

P.S.—I have mentioned your book to almost every one who, as far as I know, cares for the subject in England; and I have ordered a copy to be sent to our Royal Society.

[The next letter, to Dr. Behrens, refers to the same subject as the last:]

C. Darwin to W. Behrens.

Down, August 29 [1878].

DEAR SIR,—I am very much obliged to you for having sent me your 'Geschichte der Bestäubungs-Theorie,*' and which has interested me much. It has put some things in a

* Progr. der K. Gewerbschule zu Elberfeld, 1877, 1878.

new light, and has told me other things which I did not know. I heartily agree with you in your high appreciation of poor old C. Sprengel's work ; and one regrets bitterly that he did not live to see his labours thus valued. It rejoices me also to notice how highly you appreciate H. Müller, who has always seemed to me an admirable observer and reasoner. I am at present endeavoring to persuade an English publisher to bring out a translation of his 'Befruchtung.'

Lastly, permit me to thank you for your very generous remarks on my works. By placing what I have been able to do on this subject in systematic order, you have made me think more highly of my own work than I ever did before ! Nevertheless, I fear that you have done me more than justice.

I remain, dear Sir, yours faithfully and obliged,

CHARLES DARWIN.

[The letter which follows was called forth by Dr. Gray's article in 'Nature,' to which reference has already been made, and which appeared June 4, 1874 :]

C. Darwin to Asa Gray.

Down, June 3 [1874].

MY DEAR GRAY,—I was rejoiced to see your hand-writing again in your note of the 4th, of which more anon. I was astonished to see announced about a week ago that you were going to write in 'Nature' an article on me, and this morning I received an advance copy. It is the grandest thing ever written about me, especially as coming from a man like yourself. It has deeply pleased me, particularly some of your side remarks. It is a wonderful thing to me to live to see my name coupled in any fashion with that of Robert Brown. But you are a bold man, for I am sure that you will be sneered at by not a few botanists. I have never been so honoured before, and I hope it will do me good and make me try to be as careful as possible ; and good heavens, how difficult accuracy is ! I feel a very proud man, but I hope this won't last. . . .

[Fritz Müller has observed that the flowers of *Hedychium* are so arranged that the pollen is removed by the wings of hovering butterflies. My father's prediction of this observation is given in the following letter:]

C. Darwin to H. Müller.

Down, August 7, 1876.

. . . . I was much interested by your brother's article on *Hedychium*; about two years ago I was so convinced that the flowers were fertilized by the tips of the wings of large moths, that I wrote to India to ask a man to observe the flowers and catch the moths at work, and he sent me 20 to 30 Sphinx-moths, but so badly packed that they all arrived in fragments; and I could make out nothing. . . .

Yours sincerely,

CH. DARWIN.

[The following extract from a letter (Feb. 25, 1864), to Dr. Gray refers to another prediction fulfilled:—

“I have of course seen no one, and except good dear Hooker, I hear from no one. He, like a good and true friend, though so overworked, often writes to me.

“I have had one letter which has interested me greatly, with a paper, which will appear in the *Linnean Journal*, by Dr. Crüger of Trinidad, which shows that I am all right about *Catasetum*, even to the spot where the pollinia adhere to the bees, which visit the flower, as I said, to gnaw the labellum. Crüger's account of *Coryanthes* and the use of the bucket-like labellum full of water beats everything: I *suspect* that the bees being well wetted flattens their hairs, and allows the viscid disc to adhere.”]

C. Darwin to the Marquis de Saporta.

Down, December 24, 1877.

MY DEAR SIR,—I thank you sincerely for your long and most interesting letter, which I should have answered sooner

had it not been delayed in London. I had not heard before that I was to be proposed as a Corresponding Member of the Institute. Living so retired a life as I do, such honours affect me very little, and I can say with entire truth that your kind expression of sympathy has given and will give me much more pleasure than the election itself, should I be elected.

Your idea that dicotyledonous plants were not developed in force until sucking insects had been evolved seems to me a splendid one. I am surprised that the idea never occurred to me, but this is always the case when one first hears a new and simple explanation of some mysterious phenomenon. . . . I formerly showed that we might fairly assume that the beauty of flowers, their sweet odour and copious nectar, may be attributed to the existence of flower-haunting insects, but your idea, which I hope you will publish, goes much further and is much more important. With respect to the great development of mammals in the later Geological periods following from the development of dicotyledons, I think it ought to be proved that such animals as deer, cows, horses, &c. could not flourish if fed exclusively on the gramineæ and other anemophilous monocotyledons; and I do not suppose that any evidence on this head exists.

Your suggestion of studying the manner of fertilisation of the surviving members of the most ancient forms of the dicotyledons is a very good one, and I hope that you will keep it in mind yourself, for I have turned my attention to other subjects. Delpino I think says that *Magnolia* is fertilised by insects which gnaw the petals, and I should not be surprised if the same fact holds good with *Nymphæa*. Whenever I have looked at the flowers of these latter plants I have felt inclined to admit the view that petals are modified stamens, and not modified leaves; though *Poinsettia* seems to show that true leaves might be converted into coloured petals. I grieve to say that I have never been properly grounded in Botany and have studied only special points—therefore I cannot pretend to express any opinion on your remarks on the origin of the flowers of the *Coniferæ*, *Gneta-*

ceæ, &c. ; but I have been delighted with what you say on the conversion of a monœcious species into a hermaphrodite one by the condensations of the verticils on a branch bearing female flowers near the summit, and male flowers below.

I expect Hooker to come here before long, and I will then show him your drawing, and if he makes any important remarks I will communicate with you. He is very busy at present in clearing off arrears after his American Expedition, so that I do not like to trouble him, even with the briefest note. I am at present working with my son at some Physiological subjects, and we are arriving at very curious results, but they are not as yet sufficiently certain to be worth communicating to you. . . .

[In 1877 a second edition of the 'Fertilisation of Orchids' was published, the first edition having been for some time out of print. The new edition was remodelled and almost rewritten, and a large amount of new matter added, much of which the author owed to his friend Fritz Müller.

With regard to this edition he wrote to Dr. Gray:—

"I do not suppose I shall ever again touch the book. After much doubt I have resolved to act in this way with all my books for the future ; that is to correct them once and never touch them again, so as to use the small quantity of work left in me for new matter."

He may have felt a diminution of his powers of reviewing large bodies of facts, such as would be needed in the preparation of new editions, but his powers of observation were certainly not diminished. He wrote to Mr. Dyer on July 14, 1878:]

MY DEAR DYER,—*Thalia dealbata* was sent me from Kew : it has flowered and after looking casually at the flowers, they have driven me almost mad, and I have worked at them for a week : it is as grand a case as that of *Catasetum*.

Pistil vigorously motile (so that whole flower shakes when pistil suddenly coils up) ; when excited by a touch the two

filaments [are] produced laterally and transversely across the flower (just over the nectar) from one of the petals or modified stamens. It is splendid to watch the phenomenon under a weak power when a bristle is inserted into a *young* flower which no insect has visited. As far as I know Stylidium is the sole case of sensitive pistil and here it is the pistil+stamens. In *Thalia* * cross-fertilisation is ensured by the wonderful movement, if bees visit several flowers.

I have now relieved my mind and will tell the purport of this note—viz. if any other species of *Thalia* besides *T. dealbata* should flower with you, for the love of heaven and all the saints, send me a few in *tin box with damp moss*.

Your insane friend,

CH. DARWIN.

[In 1878 Dr. Ogle's translation of Kerner's interesting book, 'Flowers and their Unbidden Guests,' was published. My father, who felt much interest in the translation (as appears in the following letter), contributed some prefatory words of approval:]

C. Darwin to W. Ogle.

Down, December 16 [1878].

. . . . I have now read Kerner's book, which is better even than I anticipated. The translation seems to me as clear as daylight, and written in forcible and good familiar English. I am rather afraid that it is too good for the English public, which seems to like very washy food, unless it be administered by some one whose name is well known, and then I suspect a good deal of the unintelligible is very pleasing to them. I hope to heaven that I may be wrong. Anyhow, you and Mrs. Ogle have done a right good service for Botanical Science. Yours very sincerely,

CH. DARWIN.

* Hildebrand has described an explosive arrangement in some of the *Marantææ*—the tribe to which *Thalia* belongs.

P.S.—You have done me much honour in your prefatory remarks.

[One of the latest references to his Orchid-work occurs in a letter to Mr. Bentham, February 16, 1880. It shows the amount of pleasure which this subject gave to my father, and (what is characteristic of him) that his reminiscence of the work was one of delight in the observations which preceded its publication, not to the applause which followed it:—

“They are wonderful creatures, these Orchids, and I sometimes think with a glow of pleasure, when I remember making out some little point in their method of fertilisation.”]

CHAPTER XI.

THE 'EFFECTS OF CROSS- AND SELF-FERTILISATION IN THE VEGETABLE KINGDOM.' 1876.

[THIS book, as pointed out in the 'Autobiography,' is a complement to the 'Fertilisation of Orchids,' because it shows how important are the results of cross-fertilisation which are ensured by the mechanisms described in that book. By proving that the offspring of cross-fertilisation are more vigorous than the offspring of self-fertilisation, he showed that one circumstance which influences the fate of young plants in the struggle for life is the degree to which their parents are fitted for cross-fertilisation. He thus convinced himself that the intensity of the struggle (which he had elsewhere shown to exist among young plants) is a measure of the strength of a selective agency perpetually sifting out every modification in the structure of flowers which can effect its capabilities for cross-fertilisation.

The book is also valuable in another respect, because it throws light on the difficult problems of the origin of sexuality. The increased vigour resulting from cross-fertilisation is allied in the closest manner to the advantage gained by change of conditions. So strongly is this the case, that in some instances cross-fertilisation gives no advantage to the offspring, unless the parents have lived under slightly different conditions. So that the really important thing is not that two individuals of different *blood* shall unite, but two individuals which have been subjected to different conditions. We are thus led to believe that sexuality is a means for infusing vigour into the offspring by the coalescence of differentiated elements, an

advantage which could not follow if reproductions were entirely asexual.

It is remarkable that this book, the result of eleven years of experimental work, owed its origin to a chance observation. My father had raised two beds of *Linaria vulgaris*—one set being the offspring of cross- and the other of self-fertilisation. These plants were grown for the sake of some observations on inheritance, and not with any view to cross-breeding, and he was astonished to observe that the offspring of self-fertilisation were clearly less vigorous than the others. It seemed incredible to him that this result could be due to a single act of self-fertilisation, and it was only in the following year when precisely the same result occurred in the case of a similar experiment on inheritance in Carnations, that his attention was “thoroughly aroused” and that he determined to make a series of experiments specially directed to the question. The following letters give some account of the work in question :]

C. Darwin to Asa Gray.

September 10, [1866 ?]

. . . . I have just begun a large course of experiments on the germination of the seed, and on the growth of the young plants when raised from a pistil fertilised by pollen from the same flower, and from pollen from a distinct plant of the same, or of some other variety. I have not made sufficient experiments to judge certainly, but in some cases the difference in the growth of the young plants is highly remarkable. I have taken every kind of precaution in getting seed from the same plant, in germinating the seed on my own chimney-piece, in planting the seedlings in the same flower-pot, and under this similar treatment I have seen the young seedlings from the crossed seed exactly twice as tall as the seedlings from the self-fertilised seed ; both seeds having germinated on same day. If I can establish this fact (but perhaps it will all go to the dogs), in some fifty cases, with plants of different

orders, I think it will be very important, for then we shall positively know why the structure of every flower permits, or favours, or necessitates an occasional cross with a distinct individual. But all this is rather cooking my hare before I have caught it. But somehow it is a great pleasure to me to tell you what I am about. Believe me, my dear Gray,

Ever yours most truly, and with cordial thanks,

CH. DARWIN.

C. Darwin to G. Bentham.

April 22, 1868.

. . . . I am experimenting on a very large scale on the difference in power of growth between plants raised from self-fertilised and crossed seeds; and it is no exaggeration to say that the difference in growth and vigour is sometimes truly wonderful. Lyell, Huxley and Hooker have seen some of my plants, and been astonished; and I should much like to show them to you. I always supposed until lately that no evil effects would be visible until after several generations of self-fertilisation; but now I see that one generation sometimes suffices; and the existence of dimorphic plants and all the wonderful contrivances of orchids are quite intelligible to me.

With cordial thanks for your letter, which has pleased me greatly,

Yours very sincerely,

CHARLES DARWIN.

[An extract from a letter to Dr. Gray (March 11, 1873) mentions the progress of the work:—

“I worked last summer hard at *Drosera*, but could not finish till I got fresh plants, and consequently took up the effects of crossing and self-fertilising plants, and am got so interested that *Drosera* must go to the dogs till I finish with this, and get it published; but then I will resume my beloved *Drosera*, and I heartily apologise for having sent the precious little things even for a moment to the dogs.”

The following letters give the author's impression of his own book.]

C. Darwin to J. Murray.

Down, September 16, 1876.

MY DEAR SIR,—I have just received proofs in sheet of five sheets, so you will have to decide soon how many copies will have to be struck off. I do not know what to advise. The greater part of the book is extremely dry, and the whole on a special subject. Nevertheless, I am convinced that the book is of value, and I am convinced that for *many* years copies will be occasionally sold. Judging from the sale of my former books, and from supposing that some persons will purchase it to complete the set of my works, I would suggest 1500. But you must be guided by your larger experience. I will only repeat that I am convinced the book is of some permanent value. . . .

C. Darwin to Victor Carus.

Down, September 27, 1876.

MY DEAR SIR,—I sent by this morning's post the four first perfect sheets of my new book, the title of which you will see on the first page, and which will be published early in November.

I am sorry to say that it is only shorter by a few pages than my 'Insectivorous Plants.' The whole is now in type, though I have corrected finally only half the volume. You will, therefore, rapidly receive the remainder. The book is very dull. Chapters II. to VI., inclusive, are simply a record of experiments. Nevertheless, I believe (though a man can never judge his own books) that the book is valuable. You will have to decide whether it is worth translating. I hope so. It has cost me very great labour, and the results seem to me remarkable and well established.

If you translate it, you could easily get aid for Chapters II. to VI., as there is here endless, but I have thought

necessary repetition. I shall be anxious to hear what you decide.

I most sincerely hope that your health has been fairly good this summer.

My dear Sir, yours very truly,

CH. DARWIN.

C. Darwin to Asa Gray.

Down, October 28, 1876.

MY DEAR GRAY,—I send by this post all the clean sheets as yet printed, and I hope to send the remainder within a fortnight. Please observe that the first six chapters are not readable, and the six last very dull. Still I believe that the results are valuable. If you review the book, I shall be very curious to see what you think of it, for I care more for your judgment than for that of almost any one else. I know also that you will speak the truth, whether you approve or disapprove. Very few will take the trouble to read the book, and I do not expect you to read the whole, but I hope you will read the latter chapters.

. . . I am so sick of correcting the press and licking my horrid bad style into intelligible English.

[The 'Effects of Cross and Self-fertilisation' was published on November 10, 1876, and 1500 copies were sold before the end of the year. The following letter refers to a review in 'Nature: '*]

C. Darwin to W. Thiselton Dyer.

Down, February 16, 1877.

DEAR DYER,—I must tell you how greatly I am pleased and honoured by your article in 'Nature,' which I have just read. You are an adept in saying what will please an author, not that I suppose you wrote with this express intention.

* February 15, 1877.

I should be very well contented to deserve a fraction of your praise. I have also been much interested, and this is better than mere pleasure, by your argument about the separation of the sexes. I dare say that I am wrong, and will hereafter consider what you say more carefully : but at present I cannot drive out of my head that the sexes must have originated from two individuals, slightly different, which conjugated. But I am aware that some cases of conjugation are opposed to any such views.

With hearty thanks,

Yours sincerely,

CHARLES DARWIN.

CHAPTER XII.

‘DIFFERENT FORMS OF FLOWERS ON PLANTS OF THE SAME SPECIES.’ 1877.

[THE volume bearing the above title was published in 1877, and was dedicated by the author to Professor Asa Gray, “as a small tribute of respect and affection.” It consists of certain earlier papers re-edited, with the addition of a quantity of new matter. The subjects treated in the book are:—

- (i.) Heterostyled Plants.
- (ii.) Polygamous, Dioecious, and Gynodioecious Plants.
- (iii.) Cleistogamic Flowers.

The nature of heterostyled plants may be illustrated in the primrose, one of the best known examples of the class. If a number of primroses be gathered, it will be found that some plants yield nothing but “pin-eyed” flowers, in which the style (or organ for the transmission of the pollen to the ovule) is long, while the others yield only “thrum-eyed” flowers with short styles. Thus primroses are divided into two sets or castes differing structurally from each other. My father showed that they also differ sexually, and that in fact the bond between the two castes more nearly resembles that between separate sexes than any other known relationship. Thus for example a long-styled primrose, though it can be fertilised by its own pollen, is not *fully* fertile unless it is impregnated by the pollen of a short-styled flower. Heterostyled plants are comparable to hermaphrodite animals, such as snails, which require the concourse of two individuals, although each possesses both the sexual elements. The difference is that in the case of the primrose it is *perfect fertility*, and not simply

fertility, that depends on the mutual action of the two sets of individuals.

The work on heterostyled plants has a special bearing, to which the author attached much importance, on the problem of origin of species.*

He found that a wonderfully close parallelism exists between hybridisation and certain forms of fertilisation among heterostyled plants. So that it is hardly an exaggeration to say that the "illegitimately" reared seedlings are hybrids, although both their parents belong to identically the same species. In a letter to Professor Huxley, given in the second volume (p. 176), my father writes as if his researches on heterostyled plants tended to make him believe that sterility is a selected or acquired quality. But in his later publications, e.g. in the sixth edition of the 'Origin,' he adheres to the belief that sterility is an incidental rather than a selected quality. The result of his work on heterostyled plants is of importance as showing that sterility is no test of specific distinctness, and that it depends on differentiation of the sexual elements which is independent of any racial difference. I imagine that it was his instinctive love of making out a difficulty which to a great extent kept him at work so patiently on the heterostyled plants. But it was the fact that general conclusions of the above character could be drawn from his results which made him think his results worthy of publication.†

The papers which on this subject preceded and contributed to 'Forms of Flowers' were the following:—

"On the two Forms or Dimorphic Condition in the Species of *Primula*, and on their remarkable Sexual Relations." Linn. Soc. Journal, 1862.

"On the Existence of Two Forms, and on their Reciprocal Sexual Relations, in several Species of the Genus *Linum*." Linn. Soc. Journal, 1863.

* See 'Autobiography,' vol. i. p. 97.

† See 'Forms of Flowers,' p. 243.

"On the Sexual Relations of the Three Forms of *Lythrum salicaria*," Ibid. 1864.

"On the Character and Hybrid-like Nature of the Offspring from the Illegitimate Unions of Dimorphic and Trimorphic Plants." Ibid. 1869.

"On the Specific Differences between *Primula veris*, Brit. Fl. (var. *officinalis*, Linn.), *P. vulgaris*, Brit. Fl. (var. *acaulis*, Linn.), and *P. elatior*, Jacq.; and on the Hybrid Nature of the Common Oxlip. With Supplementary Remarks on Naturally Produced Hybrids in the Genus *Verbascum*." Ibid. 1869.

The following letter shows that he began the work on heterostyled plants with an erroneous view as to the meaning of the facts.]

C. Darwin to J. D. Hooker.

Down, May 7 [1860].

. . . . I have this morning been looking at my experimental cowslips, and I find some plants have all flowers with long stamens and short pistils, which I will call "male plants," others with short stamens and long pistils, which I will call "female plants." This I have somewhere seen noticed, I think by Henslow; but I find (after looking at my two sets of plants) that the stigmas of the male and female are of slightly different shape, and certainly different degree of roughness, and what has astonished me, the pollen of the so-called female plant, though very abundant, is more transparent, and each granule is exactly only $\frac{2}{3}$ of the size of the pollen of the so-called male plant. Has this been observed? I cannot help suspecting [that] the cowslip is in fact dioecious, but it may turn out all a blunder, but anyhow I will mark with sticks the so-called male and female plants and watch their seeding. It would be a fine case of gradation between an hermaphrodite and unisexual condition. Likewise a sort of case of balancement of long and short pistils and stamens. Likewise perhaps throws light on oxlips. . . .

I have now examined primroses and find exactly the same difference in the size of the pollen, correlated with the same difference in the length of the style and roughness of the stigmas.

C. Darwin to Asa Gray.

June 8 [1860].

. . . . I have been making some little trifling observations which have interested and perplexed me much. I find with primroses and cowslips, that about an equal number of plants are thus characterised.

So-called (by me) *male* plant. Pistil much shorter than stamens; stigma rather smooth,—*pollen grains large*, throat of corolla short.

So-called female plant. Pistil much longer than stamens, stigma rougher, *pollen-grains smaller*,—throat of corolla long.

I have marked a lot of plants, and expected to find the so-called male plant barren; but judging from the feel of the capsules, this is not the case, and I am very much surprised at the difference in the size of the pollen. . . . If it should prove that the so-called male plants produce less seed than the so-called females, what a beautiful case of gradation from hermaphrodite to unisexual condition it will be! If they produce about equal number of seed, how perplexing it will be.

C. Darwin to J. D. Hooker.

Down, December 17, [1860?]

. . . . I have just been ordering a photograph of myself for a friend; and have ordered one for you, and for heaven's sake oblige me, and burn that now hanging up in your room.—It makes me look atrociously wicked.

. . . . In the spring I must get you to look for long pistils and short pistils in the rarer species of *Primula* and in some allied Genera. It holds with *P. Sinensis*. You remember all the fuss I made on this subject last spring; well, the other day at last I had time to weigh the seeds, and by Jove the plants of primroses and cowslip with short pistils and large

grained pollen * are rather more fertile than those with long pistils, and small-grained pollen. I find that they require the action of insects to set them, and I never will believe that these differences are without some meaning.

Some of my experiments lead me to suspect that the large-grained pollen suits the long pistils and the small-grained pollen suits the short pistils ; but I am determined to see if I cannot make out the mystery next spring.

How does your book on plants brew in your mind ? Have you begun it ?

Remember me most kindly to Oliver. He must be astonished at not having a string of questions, I fear he will get out of practice !

[The *Primula*-work was finished in the autumn of 1861, and on Nov. 8th he wrote to Sir J. D. Hooker :—

“I have sent my paper on dimorphism in *Primula* to the Linn. Soc. I shall go up and read it whenever it comes on ; I hope you may be able to attend, for I do not suppose many will care a penny for the subject.”

With regard to the reading of the paper (on Nov. 21st), he wrote to the same friend :—

“I by no means thought that I produced a “tremendous effect” in the Linn. Soc., but by Jove the Linn. Soc. produced a tremendous effect on me, for I could not get out of bed till late next evening, so that I just crawled home. I fear I must give up trying to read any paper or speak ; it is a horrid bore, I can do nothing like other people.”

To Dr. Gray he wrote, (Dec. 1861) :—

“You may rely on it, I will send you a copy of my *Primula* paper as soon as I can get one ; but I believe it will not be printed till April 1st, and therefore after my *Orchid Book*. I care more for your and Hooker’s opinion than for that of all the rest of the world, and for Lyell’s on geological points. Bentham and Hooker thought well of my paper when read ;

* Thus the plants which he imagined to be tending towards a male condition were more productive than the supposed females.

but no one can judge of evidence by merely hearing a paper."

The work on *Primula* was the means of bringing my father in contact with the late Mr. John Scott, then working as a gardener in the Botanic Gardens at Edinburgh,—an employment which he seems to have chosen in order to gratify his passion for natural history. He wrote one or two excellent botanical papers, and ultimately obtained a post in India.* He died in 1880.

A few phrases may be quoted from letters to Sir J. D. Hooker, showing my father's estimate of Scott:—

"If you know, do please tell me who is John Scott of the Botanical Gardens of Edinburgh; I have been corresponding largely with him; he is no common man."

"If he had leisure he would make a wonderful observer; to my judgment I have come across no one like him."

"He has interested me strangely, and I have formed a very high opinion of his intellect. I hope he will accept pecuniary assistance from me; but he has hitherto refused." (He ultimately succeeded in being allowed to pay for Mr. Scott's passage to India.)

"I know nothing of him excepting from his letters; these show remarkable talent, astonishing perseverance, much modesty, and what I admire, determined difference from me on many points."

So highly did he estimate Scott's abilities that he formed a plan (which however never went beyond an early stage of discussion) of employing him to work out certain problems connected with intercrossing.

The following letter refers to my father's investigations on *Lythrum*,† a plant which reveals even a more wonderful

* While in India he made some admirable observations on expression for my father.

† He was led to this, his first case of trimorphism by Lecoq's '*Géographie Botanique*,' and this must have consoled him for the trick this work played him in turning out to be so much larger than he expected. He wrote to Sir J. D. Hooker: "Here is a good joke: I saw an extract

condition of sexual complexity than that of *Primula*. For in *Lythrum* there are not merely two, but three castes, differing structurally and physiologically from each other :]

C. Darwin to Asa Gray.

Down, August 9 [1862].

MY DEAR GRAY,—It is late at night, and I am going to write briefly, and of course to beg a favour.

The *Mitchella* very good, but pollen apparently equal-sized. I have just examined *Hottonia*, grand difference in pollen. *Echium vulgare*, a humbug, merely a case like *Thymus*. But I am almost stark staring mad over *Lythrum* ; * if I can prove what I fully believe, it is a grand case of TRIMORPHISM, with three different pollens and three stigmas ; I have castrated and fertilised above ninety flowers, trying all the eighteen distinct crosses which are possible within the limits of this one species ! I cannot explain, but I feel sure you would think it a grand case. I have been writing to Botanists to see if I can possibly get *L. hyssopifolia*, and it has just flashed on me that you might have *Lythrum* in North America, and I have looked to your Manual. For the love of heaven have a look at some of your species, and if you can get me seed, do ; I want much to try species with few stamens, if they are dimorphic ; *Nesaea verticillata* I should expect to be trimorphic. Seed ! Seed ! Seed ! I should rather like seed of *Mitchella*. But oh, *Lythrum* !

Your utterly mad friend,

C. DARWIN.

P.S.—There is reason in my madness, for I can see that to those who already believe in change of species, these facts

from Lecoq, 'Géograph. Bot.,' and ordered it and hoped that it was a good sized pamphlet, and nine thick volumes have arrived ! "

* On another occasion he wrote (to Dr. Gray) with regard to *Lythrum* : "I must hold hard, otherwise I shall spend my life over dimorphism."

will modify to a certain extent the whole view of Hybridity.*

[On the same subject he wrote to Sir Joseph Hooker in August 1862 :—

“Is Oliver at Kew? When I am established at Bourne-mouth I am completely mad to examine any fresh flowers of any Lythraceous plant, and I would write and ask him if any are in bloom.”

Again he wrote to the same friend in October :—

“If you ask Oliver, I think he will tell you I have got a real odd case in *Lythrum*, it interests me extremely, and seems to me the strangest case of propagation recorded amongst plants or animals, viz. a necessary triple alliance between three hermaphrodites. I feel sure I can now prove the truth of the case from a multitude of crosses made this summer.”

In an article, ‘Dimorphism in the Genitalia of Plants’ (*Silliman’s Journal*, 1862, vol. xxxiv. p. 419), Dr. Gray pointed out that the structural difference between the two forms of *Primula* had already been defined in the ‘Flora of N. America,’ as *diœcio-dimorphism*. The use of this term called forth the following remarks from my father. The letter also alludes to a review of the ‘Fertilisation of Orchids’ in the same volume of ‘*Silliman’s Journal*.’]

* A letter to Dr. Gray (July, 1862) bears on this point : “A few days ago I made an observation which has surprised me more than it ought to do—it will have to be repeated several times, but I have scarcely a doubt of its accuracy. I stated in my *Primula* paper that the long-styled form of *Linum grandiflorum* was utterly sterile with its own pollen; I have lately been putting the pollen of the two forms on the stigma of the same flower; and it strikes me as truly wonderful, that the stigma distinguishes the pollen; and is penetrated by the tubes of the one and not by those of the other; nor are the tubes exerted. Or (which is the same thing) the stigma of the one form acts on and is acted on by pollen, which produces not the least effect on the stigma of the other form. Taking sexual power as the criterion of difference, the two forms of this one species may be said to be generically distinct.”

C. Darwin to Asa Gray.

Down, November 26 [1862].

MY DEAR GRAY,—The very day after my last letter, yours of November 10th, and the review in 'Silliman,' which I feared might have been lost, reached me. We were all very much interested by the political part of your letter; and in some odd way one never feels that information and opinions painted in a newspaper come from a living source; they seem dead, whereas all that you write is full of life. The reviews interested me profoundly; you rashly ask for my opinion, and you must consequently endure a long letter. First for Dimorphism; I do not *at present* like the term "Dioecio-dimorphism;" for I think it gives quite a false notion, that the phenomena are connected with a separation of the sexes. Certainly in *Primula* there is unequal fertility in the two forms, and I suspect this is the case with *Linum*; and, therefore I felt bound in the *Primula* paper to state that it might be a step towards a dioecious condition; though I believe there are no dioecious forms in *Primulaceæ* or *Linaceæ*. But the three forms in *Lythrum* convince me that the phenomenon is in no way necessarily connected with any tendency to separation of sexes. The case seems to me in result or function to be almost identical with what old C. K. Sprengel called "dichogamy," and which is so frequent in truly hermaphrodite groups; namely, the pollen and stigma of each flower being mature at different periods. If I am right, it is very advisable not to use the term "dioecious," as this at once brings notions of separation of sexes.

. . . I was much perplexed by Oliver's remarks in the 'Natural History Review' on the *Primula* case, on the lower plants having sexes more often separated than in the higher plants,—so exactly the reverse of what takes place in animals. Hooker in his review of the 'Orchids' repeats this remark. There seems to be much truth in what you

say,* and it did not occur to me, about no improbability of specialisation in *certain* lines in lowly organised beings. I could hardly doubt that the hermaphrodite state is the aboriginal one. But how is it in the conjugation of *Convolvæ*—is not one of the two individuals here in fact male, and the other female? I have been much puzzled by this contrast in sexual arrangements between plants and animals. Can there be anything in the following consideration: By *roughest* calculation about one-third of the British *genera* of aquatic plants belong to the Linnean classes of Mono and Dioecia; whilst of terrestrial plants (the aquatic genera being subtracted) only one-thirteenth of the genera belong to these two classes. Is there any truth in this fact generally? Can aquatic plants, being confined to a small area or small community of individuals, require more free crossing, and therefore have separate sexes? But to return to our point, does not Alph. de Candoille say that aquatic plants taken as a whole are lowly organised, compared with terrestrial; and may not Oliver's remark on the separation of the sexes in lowly organised plants stand in some relation to their being frequently aquatic? Or is this all rubbish?

. . . . What a magnificent compliment you end your review with! You and Hooker seem determined to turn my head with conceit and vanity (if not already turned) and make me an unbearable wretch.

With most cordial thanks, my good and kind friend,

Farewell,

C. DARWIN.

[The following passage from a letter (July 28, 1863), to Prof. Hildebrand, contains a reference to the reception of the dimorphic work in France:—

"I am extremely much pleased to hear that you have been

* "Forms which are low in the scale as respects morphological completeness may be high in the scale of rank founded on specialisation of structure and function."—Dr. Gray, in 'Silliman's Journal.'

looking at the manner of fertilisation of your native Orchids, and still more pleased to hear that you have been experimenting on *Linum*. I much hope that you may publish the result of these experiments ; because I was told that the most eminent French botanists of Paris said that my paper on *Primula* was the work of imagination, and that the case was so improbable they did not believe in my results."]

C. Darwin to Asa Gray.

April 19 [1864].

. . . . I received a little time ago a paper with a good account of your Herbarium and Library, and a long time previously your excellent review of Scott's '*Primulaceæ*,' and I forwarded it to him in India, as it would much please him. I was very glad to see in it a new case of Dimorphism (I forget just now the name of the plant) ; I shall be grateful to hear of any other cases, as I still feel an interest in the subject. I should be very glad to get some seed of your dimorphic *Plantagos* ; for I cannot banish the suspicion that they must belong to a very different class like that of the common Thyme.* How could the wind, which is the agent of fertilisation, with *Plantago*, fertilise "reciprocally dimorphic" flowers like *Primula*? Theory says this cannot be, and in such cases of one's own theories I follow Agassiz and declare, "that nature never lies." I should even be very glad to examine the two dried forms of *Plantago*. Indeed, any dried dimorphic plants would be gratefully received. . . .

Did my *Lythrum* paper interest you? I crawl on at the rate of two hours per diem, with '*Variation under Domestication*.'

C. Darwin to J. D. Hooker.

Down, November 26 [1864].

. . . . You do not know how pleased I am that you have read my *Lythrum* paper ; I thought you would not have time,

* In this prediction he was right. See '*Forms of Flowers*,' p. 307.

and I have for long years looked at you as my Public, and care more for your opinion than that of all the rest of the world. I have done nothing which has interested me so much as *Lythrum*, since making out the complemental males of *Cirripedes*. I fear that I have dragged in too much miscellaneous matter into the paper.

. . . I get letters occasionally, which show me that Natural Selection is making *great* progress in Germany, and some amongst the young in France. I have just received a pamphlet from Germany, with the complimentary title of "Darwinische Arten-Entstehung-Humbug"!

Farewell, my best of old friends,

C. DARWIN.

C. Darwin to Asa Gray.

September 10, [1867?]

. . . . The only point which I have made out this summer, which could possibly interest you, is that the common Oxlip found everywhere, more or less commonly in England, is certainly a hybrid between the primrose and cowslip; whilst the *P. elatior* (Jacq.), found only in the Eastern Counties, is a perfectly distinct and good species; hardly distinguishable from the common oxlip, except by the length of the seed-capsule relatively to the calyx. This seems to me rather a horrid fact for all systematic botanists. . . .

C. Darwin to F. Hildebrand.

Down, November 16, 1868.

MY DEAR SIR,—I wrote my last note in such a hurry from London, that I quite forgot what I chiefly wished to say, namely to thank you for your excellent notices in the 'Bot. Zeitung' of my paper on the offspring of dimorphic plants. The subject is so obscure that I did not expect that any one would have noticed my paper, and I am accordingly very much pleased that you should have brought the subject before the many excellent naturalists of Germany.

Of all the German authors (but they are not many) whose works I have read, you write by far the clearest style, but whether this is a compliment to a German writer I do not know.

[The two following letters refer to the small bud-like "Cleistogamic" flowers found in the violet and many other plants. They do not open and are necessarily self-fertilised :]

C. Darwin to J. D. Hooker.

Down, May 30 [1862].

. . . . What will become of my book on Variation? I am involved in a multiplicity of experiments. I have been amusing myself by looking at the small flowers of *Viola*. If Oliver* has had time to study them, he will have seen the curious case (as it seems to me) which I have just made clearly out, viz. that in these flowers, the *few* pollen grains are never shed, or never leave the anther-cells, but emit long pollen tubes, which penetrate the stigma. To-day I got the anther with the included pollen grain (now empty) at one end, and a bundle of tubes penetrating the stigmatic tissue at the other end; I got the whole under a microscope without breaking the tubes; I wonder whether the stigma pours some fluid into the anther so as to excite the included grains. It is a rather odd case of correlation, that in the double sweet violet the little flowers are double; *i. e.*, have a multitude of minute scales representing the petals. What queer little flowers they are.

Have you had time to read poor dear Henslow's life? it has interested me for the man's sake, and, what I did not think possible, has even exalted his character in my estimation.

* Shortly afterwards he wrote: " Oliver, the omniscient, has sent me a paper in the 'Bot. Zeitung,' with most accurate description of all that I saw in *Viola*."

[The following is an extract from the letter given in part at p. 477, and refers to Dr. Gray's article on the sexual differences of plants :]

C. Darwin to Asa Gray.

November 26 [1862].

. . . . You will think that I am in the most unpleasant, contradictory, fractious humour, when I tell you that I do not like your term of "precocious fertilisation" for your second class of dimorphism [*i. e.* for cleistogamic fertilisation]. If I can trust my memory, the state of the corolla, of the stigma, and the pollen-grains is different from the state of the parts in the bud ; that they are in a condition of special modification. But upon my life I am ashamed of myself to differ so much from my betters on this head. The *temporary* theory* which I have formed on this class of dimorphism, just to guide experiment, is that the *perfect* flowers can only be perfectly fertilised by insects, and are in this case abundantly crossed ; but that the flowers are not always, especially in early spring, visited enough by insects, and therefore the little imperfect self-fertilising flowers are developed to ensure a sufficiency of seed for present generations. *Viola canina* is sterile, when not visited by insects, but when so visited forms plenty of seed. I infer from the structure of three or four forms of *Balsamineæ*, that these require insects ; at least there is almost as plain adaptation to insects as in the Orchids. I have *Oxalis acetosella* ready in pots for experiment next spring ; and I fear this will upset my little theory. . . . *Campanula carpathica*, as I found this summer, is absolutely sterile if insects are excluded. *Specularia speculum* is fairly fertile when enclosed ; and this seemed to me to be partially effected by the frequent closing of the flower ; the inward angular folds of the corolla corresponding with the clefts of the open stigma, and in this action pushing pollen

* This view is now generally accepted.

from the outside of the stigma on to its surface. Now can you tell me, does *S. perfoliata* close its flower like *S. speculum*, with angular inward folds? if so, I am smashed without some fearful "wriggling." Are the *imperfect* flowers of your *Specularia* the early or the later ones? very early or very late? It is rather pretty to see the importance of the closing of flowers of *S. speculum*.

['Forms of Flowers' was published in July; in June, 1877, he wrote to Professor Carus with regard to the translation:—

"My new book is not a long one, viz. 350 pages, chiefly of the larger type, with fifteen simple woodcuts. All the proofs are corrected except the Index, so that it will soon be published.

". . . . I do not suppose that I shall publish any more books, though perhaps a few more papers. I cannot endure being idle, but heaven knows whether I am capable of any more good work."

The review alluded to in the next letter is at p. 445 of the volume of 'Nature' for 1878:]

C. Darwin to W. Thiselton Dyer.

Down, April 5, 1878.

MY DEAR DYER,—I have just read in 'Nature' the review of 'Forms of Flowers,' and I am sure that it is by you. I wish with all my heart that it deserved one quarter of the praises which you give it. Some of your remarks have interested me greatly. . . . Hearty thanks for your generous and most kind sympathy, which does a man real good, when he is as dog-tired as I am at this minute with working all day, so good-bye.

C. DARWIN.

CHAPTER XIII.

CLIMBING AND INSECTIVOROUS PLANTS.

[My father mentions in his 'Autobiography' (vol. i. p. 75) that he was led to take up the subject of climbing plants by reading Dr. Gray's paper, "Note on the Coiling of the Tendrils of Plants." * This essay seems to have been read in 1862, but I am only able to guess at the date of the letter in which he asks for a reference to it, so that the precise date of his beginning this work cannot be determined.

In June 1863 he was certainly at work, and wrote to Sir. J. D. Hooker for information as to previous publications on the subject, being then in ignorance of Palm's and H. v. Mohl's works on climbing plants, both of which were published in 1827.]

C. Darwin to J. D. Hooker.

Down [June] 25 [1863].

MY DEAR HOOKER,—I have been observing pretty carefully a little fact which has surprised me ; and I want to know from you and Oliver whether it seems new or odd to you, so just tell me whenever you write ; it is a very trifling fact, so do not answer on purpose.

I have got a plant of *Echinocystis lobata* to observe the irritability of the tendrils described by Asa Gray, and which of course, is plain enough. Having the plant in my study, I have been surprised to find that the uppermost part of each branch (*i. e.* the stem between the two uppermost leaves ex-

* 'Proc. Amer. Acad. of Arts and Sciences,' 1858.

cluding the growing tip) is *constantly* and slowly twisting round making a circle in from one-half to two hours ; it will sometimes go round two or three times, and then at the same rate untwists and twists in opposite directions. It generally rests half an hour before it retrogrades. The stem does not become permanently twisted. The stem beneath the twisting portion does not move in the least, though not tied. The movement goes on all day and all early night. It has no relation to light for the plant stands in my window and twists from the light just as quickly as towards it. This may be a common phenomenon for what I know, but it confounded me quite, when I began to observe the irritability of the tendrils. I do not say it is the final cause, but the result is pretty, for the plant every one and a half or two hours sweeps a circle (according to the length of the bending shoot and the length of the tendril) of from one foot to twenty inches in diameter, and immediately that the tendril touches any object its sensitiveness causes it immediately to seize it ; a clever gardener, my neighbour, who saw the plant on my table last night, said : "I believe, Sir, the tendrils can see, for wherever I put a plant it finds out any stick near enough." I believe the above is the explanation, viz. that it sweeps slowly round and round. The tendrils have some sense, for they do not grasp each other when young.

Yours affectionately,
C. DARWIN.

C. Darwin to J. D. Hooker.

Down, July 14 [1863].

MY DEAR HOOKER,—I am getting very much amused by my tendrils, it is just the sort of niggling work which suits me, and takes up no time and rather rests me whilst writing. So will you just think whether you know any plant, which you could give or lend me, or I could buy, with tendrils, remarkable in any way for development, for odd or peculiar structure, or even for an odd place in natural arrangement. I have seen or can see Cucurbitaceæ, Passion-flower, Virginian-

creeper, *Cissus discolor*, Common-pea and Everlasting-pea. It is really curious the diversification of irritability (I do not mean the spontaneous movement, about which I wrote before and correctly, as further observation shows): for instance, I find a slight pinch between the thumb and finger at the end of the tendril of the Cucurbitaceæ causes prompt movement, but a pinch excites no movement in *Cissus*. The cause is that one side alone (the concave) is irritable in the former; whereas both sides are irritable in *Cissus*, so if you excite at the same time both *opposite* sides there is no movement, but by touching with a pencil the two branches of the tendril, in any part whatever, you cause movement towards that point; so that I can mould, by a mere touch, the two branches into any shape I like. . .

C. Darwin to Asa Gray.

Down, August 4 [1863].

My present hobby-horse I owe to you, viz. the tendrils: their irritability is beautiful, as beautiful in all its modifications as anything in Orchids. About the *spontaneous* movement (independent of touch) of the tendrils and upper internodes, I am rather taken aback by your saying, "is it not well known?" I can find nothing in any book which I have. . . . The spontaneous movement of the tendrils is independent of the movement of the upper internodes, but both work harmoniously together in sweeping a circle for the tendrils to grasp a stick. So with all climbing plants (without tendrils) as yet examined, the upper internodes go on night and day sweeping a circle in one fixed direction. It is surprising to watch the Apocynæ with shoots 18 inches long (beyond the supporting stick), steadily searching for something to climb up. When the shoot meets a stick, the motion at that point is arrested, but in the upper part is continued; so that the climbing of all plants yet examined is the simple result of the spontaneous circulatory movement of the upper internodes. Pray tell me whether anything has been published on this

subject? I hate publishing what is old; but I shall hardly regret my work if it is old, as it has much amused me. . . .

C. Darwin to Asa Gray.

May 28, 1864.

. . . . An Irish nobleman on his death-bed declared that he could conscientiously say that he had never throughout life denied himself any pleasure; and I can conscientiously say that I have never scrupled to trouble you; so here goes. —Have you travelled South, and can you tell me whether the trees, which *Bignonia capreolata* climbs, are covered with moss or filamentous lichen or *Tillandsia*?* I ask because its tendrils abhor a simple stick, do not much relish rough bark, but delight in wool or moss. They adhere in a curious manner by making little disks, like the *Ampelopsis*. . . . By the way, I will enclose some specimens, and if you think it worth while, you can put them under the simple microscope. It is remarkable how specially adapted some tendrils are; those of *Eccremocarpus scaber* do not like a stick, will have nothing to say to wool; but give them a bundle of culms of grass, or a bundle of bristles and they seize them well.

C. Darwin to J. D. Hooker.

Down, June 10 [1864].

. . . I have now read two German books, and all I believe that has been written on climbers, and it has stirred me up to find that I have a good deal of new matter. It is strange, but I really think no one has explained simple twining plants. These books have stirred me up, and made me wish for plants specified in them. I shall be very glad of those you mention. I have written to Veitch for young *Nepenthes* and *Vanilla* (which I believe will turn out a grand

* He subsequently learned from Dr. Gray that *Polypodium incanum* abounds on the trees in the districts where this species of *Bignonia* grows. See 'Climbing Plants,' p. 103.

case, though a root creeper), and if I cannot buy young *Vanilla* I will ask you. I have ordered a leaf-climbing fern, *Lygodium*. All this work about climbers would hurt my conscience, did I think I could do harder work.*

[He continued his observations on climbing plants during the prolonged illness from which he suffered in the autumn of 1863, and in the following spring. He wrote to Sir J. D. Hooker, apparently in March 1864 :—

“For several days I have been decidedly better, and what I lay much stress on (whatever doctors say), my brain feels far stronger, and I have lost many dreadful sensations. The hot-house is such an amusement to me, and my amusement I owe to you, as my delight is to look at the many odd leaves and plants from Kew. . . . The only approach to work which I can do is to look at tendrils and climbers, this does not distress my weakened brain. Ask Oliver to look over the enclosed queries (and do you look) and amuse a broken-down brother naturalist by answering any which he can. If you ever lounge through your houses, remember me and climbing plants.”

On October 29, 1864, he wrote to Dr. Gray :—

“I have not been able to resist doing a little more at your godchild, my climbing paper, or rather in size little book, which by Jove I will have copied out, else I shall never stop. This has been new sort of work for me, and I have been pleased to find what a capital guide for observations a full conviction of the change of species is.”

On Jan. 19, 1865, he wrote to Sir J. D. Hooker :—

“It is working hours, but I am trying to take a day’s holiday, for I finished and despatched yesterday my climbing paper. For the last ten days I have done nothing but correct refractory sentences, and I loathe the whole subject.”

A letter to Dr. Gray, April 9, 1865, has a word or two on the subject :—

“I have begun correcting proofs of my paper on ‘Climb-

* He was much out of health at this time.

ing Plants.' I suppose I shall be able to send you a copy in four or five weeks. I think it contains a good deal new and some curious points, but it is so fearfully long, that no one will ever read it. If, however, you do not *skim* through it, you will be an unnatural parent, for it is your child."

Dr. Gray not only read it but approved of it, to my father's great satisfaction, as the following extracts show:—

"I was much pleased to get your letter of July 24th. Now that I can do nothing, I maunder over old subjects, and your approbation of my climbing paper gives me *very* great satisfaction. I made my observations when I could do nothing else and much enjoyed it, but always doubted whether they were worth publishing. I demur to its not being necessary to explain in detail about the spires in *caught* tendrils running in opposite directions; for the fact for a long time confounded me, and I have found it difficult enough to explain the cause to two or three persons." (Aug. 15, 1865.)

"I received yesterday your article* on climbers, and it has pleased me in an extraordinary and even silly manner. You pay me a superb compliment, and as I have just said to my wife, I think my friends must perceive that I like praise, they give me such hearty doses. I always admire your skill in reviews or abstracts, and you have done this article excellently and given the whole essence of my paper. . . . I have had a letter from a good Zoologist in S. Brazil, F. Müller, who has been stirred up to observe climbers and gives me some curious cases of *branch*-climbers, in which branches are converted into tendrils, and then continue to grow and throw out leaves and new branches, and then lose their tendril character." (October 1865.)

The paper on Climbing Plants was republished in 1875, as a separate book. The author had been unable to give his customary amount of care to the style of the original essay, owing to the fact that it was written during a period of con-

* In the September number of 'Silliman's Journal,' concluded in the January number, 1866.

tinued ill-health, and it was now found to require a great deal of alteration. He wrote to Sir J. D. Hooker (March 3, 1875): "It is lucky for authors in general that they do not require such dreadful work in merely licking what they write into shape." And to Mr. Murray in September he wrote: "The corrections are heavy in 'Climbing Plants,' and yet I deliberately went over the MS. and old sheets three times." The book was published in September 1875, an edition of 1500 copies was struck off; the edition sold fairly well, and 500 additional copies were printed in June of the following year.]

INSECTIVOROUS PLANTS.

[In the summer of 1860 he was staying at the house of his sister-in-law, Miss Wedgwood, in Ashdown Forest, whence he wrote (July 29, 1860), to Sir Joseph Hooker:—

"Latterly I have done nothing here; but at first I amused myself with a few observations on the insect-catching power of *Drosera*; and I must consult you some time whether my 'twaddle' is worth communicating to the Linnean Society."

In August he wrote to the same friend:—

"I will gratefully send my notes on *Drosera* when copied by my copier: the subject amused me when I had nothing to do."

He has described in the 'Autobiography' (vol. i. p. 77), the general nature of these early experiments. He noticed insects sticking to the leaves, and finding that flies, &c., placed on the adhesive glands were held fast and embraced, he suspected that the leaves were adapted to supply nitrogenous food to the plant. He therefore tried the effect on the leaves of various nitrogenous fluids—with results which, as far as they went, verified his surmise. In September, 1860, he wrote to Dr. Gray:—

"I have been infinitely amused by working at *Drosera*: the movements are really curious; and the manner in which the leaves detect certain nitrogenous compounds is marvel-

lous. You will laugh; but it is, at present, my full belief (after endless experiments) that they detect (and move in consequence of) the $\frac{1}{2880}$ part of a single grain of nitrate of ammonia; but the muriate and sulphate of ammonia bother their chemical skill, and they cannot make anything of the nitrogen in these salts! I began this work on *Drosera* in relation to *gradation* as throwing light on *Dionæa*."

Later in the autumn he was again obliged to leave home for Eastbourne, where he continued his work on *Drosera*. The work was so new to him that he found himself in difficulties in the preparation of solutions, and became puzzled over fluid and solid ounces, &c. &c. To a friend, the late Mr. E. Cresy, who came to his help in the matter of weights and measures, he wrote giving an account of the experiments. The extract (November 2, 1860) which follows illustrates the almost superstitious precautions he often applied to his researches:—

"Generally I have scrutinised every gland and hair on the leaf before experimenting; but it occurred to me that I might in some way affect the leaf; though this is almost impossible, as I scrutinised with equal care those that I put into distilled water (the same water being used for dissolving the carbonate of ammonia). I then cut off four leaves (not touching them with my fingers), and put them in plain water, and four other leaves into the weak solution, and after leaving them for an hour and a half, I examined every hair on all eight leaves; no change on the four in water; every gland and hair affected in those in ammonia.

"I had measured the quantity of weak solution, and I counted the glands which had absorbed the ammonia, and were plainly affected; the result convinced me that each gland could not have absorbed more than $\frac{1}{84000}$ or $\frac{1}{88000}$ of a grain. I have tried numbers of other experiments all pointing to the same result. Some experiments lead me to believe that very sensitive leaves are acted on by much smaller doses. Reflect how little ammonia a plant can get growing on poor soil—yet it is nourished. The really sur-

prising part seems to me that the effect should be visible, and not under very high power; for after trying a high power, I thought it would be safer not to consider any effect which was not plainly visible under a two-thirds object glass and middle eye-piece. The effect which the carbonate of ammonia produces is the segregation of the homogeneous fluid in the cells into a cloud of granules and colourless fluid; and subsequently the granules coalesce into larger masses, and for hours have the oddest movements—coalescing, dividing, coalescing *ad infinitum*. I do not know whether you will care for these ill-written details; but, as you asked, I am sure I am bound to comply, after all the very kind and great trouble which you have taken.”

On his return home he wrote to Sir J. D. Hooker (November 21, 1860):—

“I have been working like a madman at *Drosera*. Here is a fact for you which is certain as you stand where you are, though you won't believe it, that a bit of hair $\frac{1}{8000}$ of one grain in weight placed on gland, will cause *one* of the gland-bearing hairs of *Drosera* to curve inwards, and will alter the condition of the contents of every cell in the foot-stalk of the gland.”

And a few days later to Lyell:—

“I will and must finish my *Drosera* MS., which will take me a week, for, at the present moment, I care more about *Drosera* than the origin of all the species in the world. But I will not publish on *Drosera* till next year, for I am frightened and astounded at my results. I declare it is a certain fact, that one organ is so sensitive to touch, that a weight seventy-eight times less than that, viz., $\frac{1}{78000}$ of a grain, which will move the best chemical balance, suffices to cause a conspicuous movement. Is it not curious that a plant should be far more sensitive to the touch than any nerve in the human body? Yet I am perfectly sure that this is true. When I am on my hobby-horse, I never can resist telling my friends how well my hobby goes, so you must forgive the rider.”

The work was continued, as a holiday task, at Bourne-

mouth, where he stayed during the autumn of 1862. The discussion in the following letter on "nervous matter" in *Drosera* is of interest in relation to recent researches on the continuity of protoplasm from cell to cell :]

C. Darwin to J. D. Hooker.

Cliff Cottage, Bournemouth.

September 26 [1862].

MY DEAR HOOKER,—Do not read this till you have leisure. If that blessed moment ever comes, I should be very glad to have your opinion on the subject of this letter. I am led to the opinion that *Drosera* must have diffused matter in organic connection, closely analogous to the nervous matter of animals. When the glands of one of the papillæ or tentacles, in its natural position is supplied with nitrogenised fluid and certain other stimulants, or when loaded with an extremely slight weight, or when struck several times with a needle, the pedicel bends near its base in under one minute. These varied stimulants are conveyed down the pedicel by some means ; it cannot be vibration, for drops of fluid put on quite quietly cause the movement ; it cannot be absorption of the fluid from cell to cell, for I can see the rate of absorption, which though quick, is far slower, and in *Dionæa* the transmission is instantaneous ; analogy from animals would point to transmission through nervous matter. Reflecting on the rapid power of absorption in the glands, the extreme sensibility of the whole organ, and the conspicuous movement caused by varied stimulants, I have tried a number of substances which are not caustic or corrosive, but most of which are known to have a remarkable action on the nervous matter of animals. You will see the results in the enclosed paper. As the nervous matter of different animals are differently acted on by the same poisons, one would not expect the same action on plants and animals ; only, if plants have diffused nervous matter, some degree of analogous action. And this is partially the case. Considering

these experiments, together with the previously made remarks on the functions of the parts, I cannot avoid the conclusion, that *Drosera* possesses matter at least in some degree analogous in constitution and function to nervous matter. Now do tell me what you think, as far as you can judge from my abstract; of course many more experiments would have to be tried; but in former years I tried on the whole leaf, instead of on separate glands, a number of innocuous* substances, such as sugar, gum, starch, &c., and they produced no effect. Your opinion will aid me in deciding some future year in going on with this subject. I should not have thought it worth attempting, but I had nothing on earth to do.

My dear Hooker, Yours very sincerely,

CH. DARWIN.

P.S.—We return home on Monday 28th. Thank Heaven !

[A long break now ensued in his work on insectivorous plants, and it was not till 1872 that the subject seriously occupied him again. A passage in a letter to Dr. Asa Gray, written in 1863 or 1864, shows, however, that the question was not altogether absent from his mind in the interim :—

“Depend on it you are unjust on the merits of my beloved *Drosera*; it is a wonderful plant, or rather a most sagacious animal. I will stick up for *Drosera* to the day of my death. Heaven knows whether I shall ever publish my pile of experiments on it.”

He notes in his diary that the last proof of the ‘Expression of the Emotions’ was finished on August 22, 1872, and that he began to work on *Drosera* on the following day.]

* This line of investigation made him wish for information on the action of poisons on plants; as in many other cases he applied to Professor Oliver, and in reference to the result wrote to Hooker: “Pray thank Oliver heartily for his heap of references on poisons.”

C. Darwin to Asa Gray.

[Sevenoaks], October 22 [1872].

. . . I have worked pretty hard for four or five weeks on *Drosera*, and then broke down ; so that we took a house near Sevenoaks for three weeks (where I now am) to get complete rest. I have very little power of working now, and must put off the rest of the work on *Drosera* till next spring, as my plants are dying. It is an endless subject, and I must cut it short, and for this reason shall not do much on *Dionæa*. The point which has interested me most is tracing the *nerves* ! which follow the vascular bundles. By a prick with a sharp lancet at a certain point, I can paralyse one-half the leaf, so that a stimulus to the other half causes no movement. It is just like dividing the spinal marrow of a frog :—no stimulus can be sent from the brain or anterior part of the spine to the hind legs ; but if these latter are stimulated, they move by reflex action. I find my old results about the astonishing sensitiveness of the nervous system (!?) of *Drosera* to various stimulants fully confirmed and extended. . . .

[His work on digestion in *Drosera* and other points in the physiology of the plant soon led him into regions where his knowledge was defective, and here the advice and assistance which he received from Dr. Burdon Sanderson was of much value :]

C. Darwin to J. Burdon Sanderson.

Down, July 25, 1873.

MY DEAR DR. SANDERSON,—I should like to tell you a little about my recent work with *Drosera*, to show that I have profited by your suggestions, and to ask a question or two.

1. It is really beautiful how quickly and well *Drosera* and *Dionæa* dissolve little cubes of albumen and gelatine. I kept the same sized cubes on wet moss for comparison. When you were here I forgot that I had tried gelatine, but albumen is far better for watching its dissolution and absorption. Frankland has told me how to test in a rough way for pep-

sin; and in the autumn he will discover what acid the digestive juice contains.

2. A decoction of cabbage-leaves and green peas causes as much inflection as an infusion of raw meat; a decoction of grass is less powerful. Though I hear that the chemists try to precipitate all albumen from the extract of belladonna, I think they must fail, as the extract causes inflection, whereas a new lot of atropine, as well as the valerianate [of atropine], produce no effect.

3. I have been trying a good many experiments with heated water. . . . Should you not call the following case one of heat rigor? Two leaves were heated to 130° , and had every tentacle closely inflected; one was taken out and placed in cold water, and it re-expanded; the other was heated to 145° , and had not the least power of re-expansion. Is not this latter case heat rigor? If you can inform me, I should very much like to hear at what temperature cold-blooded and invertebrate animals are killed.

4. I must tell you my final result, of which I am sure, [as to] the sensitiveness of *Drosera*. I made a solution of one part of phosphate of ammonia by weight to 218,750 of water; of this solution I gave so much that a leaf got $\frac{1}{8000}$ of a grain of the phosphate. I then counted the glands, and each could have got only $\frac{1}{1562500}$ of a grain; this being absorbed by the glands, sufficed to cause the tentacles bearing these glands to bend through an angle of 180° . Such sensitiveness requires hot weather, and carefully selected young yet mature leaves. It strikes me as a wonderful fact. I must add that I took every precaution, by trying numerous leaves at the same time in the solution and in the same water which was used for making the solution.

5. If you can persuade your friend to try the effects of carbonate of ammonia on the aggregation of the white blood corpuscles, I should very much like to hear the result.

I hope this letter will not have wearied you.

Believe me, yours very sincerely,

CHARLES DARWIN.

C. Darwin to W. Thiselton Dyer.

Down, 24 [December 1873?]

MY DEAR MR. DYER,—I fear that you will think me a great bore, but I cannot resist telling you that I have just found out that the leaves of *Pinguicula* possess a beautifully adapted power of movement. Last night I put on a row of little flies near one edge of two *youngish* leaves; and after 14 hours these edges are beautifully folded over so as to clasp the flies, thus bringing the glands into contact with the upper surfaces of the flies, and they are now secreting copiously above and below the flies and no doubt absorbing. The acid secretion has run down the channelled edge and has collected in the spoon-shaped extremity, where no doubt the glands are absorbing the delicious soup. The leaf on one side looks just like the helix of a human ear, if you were to stuff flies within the fold. Yours most sincerely,

CH. DARWIN.

C. Darwin to Asa Gray.

Down, June 3 [1874].

. . . . I am now hard at work getting my book on *Drosera* & Co. ready for the printers, but it will take some time, for I am always finding out new points to observe. I think you will be interested by my observations on the digestive process in *Drosera*; the secretion contains an acid of the acetic series, and some ferment closely analogous to, but not identical with, pepsin; for I have been making a long series of comparative trials. No human being will believe what I shall publish about the smallness of the doses of phosphate of ammonia which act.

. . . . I began reading the Madagascar squib* quite gravely, and when I found it stated that *Felis* and *Bos* inhabited Madagascar, I thought it was a false story, and did not perceive it was a hoax till I came to the woman. . . .

* A description of a carnivorous plant supposed to subsist on human beings.

*C. Darwin to F. C. Donders.**

Down, July 7, 1874.

MY DEAR PROFESSOR DONDERS,—My son George writes to me that he has seen you, and that you have been very kind to him, for which I return to you my cordial thanks. He tells me on your authority, of a fact which interests me in the highest degree, and which I much wish to be allowed to quote. It relates to the action of one millionth of a grain of atropine on the eye. Now will you be so kind, whenever you can find a little leisure, to tell me whether you yourself have observed this fact, or believe it on good authority. I also wish to know what proportion by weight the atropine bore to the water solution, and how much of the solution was applied to the eye. The reason why I am so anxious on this head is that it gives some support to certain facts repeatedly observed by me with respect to the action of phosphate of ammonia on *Drosera*. The $\frac{1}{1000000}$ of a grain absorbed by a gland clearly makes the tentacle which bears this gland become inflected; and I am fully convinced that $\frac{1}{2000000}$ of a grain of the crystallised salt (*i.e.* containing about one-third of its weight of water of crystallisation) does the same. Now I am quite unhappy at the thought of having to publish such a statement. It will be of great value to me to be able to give any analogous facts in support. The case of *Drosera* is all the more interesting as the absorption of the salt or any other stimulant applied to the gland causes it to transmit a motor influence to the base of the tentacle which bears the gland.

Pray forgive me for troubling you, and do not trouble yourself to answer this until your health is fully re-established.

Pray believe me,

Yours very sincerely,

CHARLES DARWIN.

* Professor Donders, the well-known physiologist of Utrecht.

[During the summer of 1874 he was at work on the genus *Utricularia*, and he wrote (July 16th) to Sir J. D. Hooker giving some account of the progress of his work :—

“I am rather glad you have not been able to send *Utricularia*, for the common species has driven F. and me almost mad. The structure is *most* complex. The bladders catch a multitude of Entomostraca, and larvæ of insects. The mechanism for capture is excellent. But there is much that we cannot understand. From what I have seen to-day, I strongly suspect that it is necrophagous, *i.e.* that it cannot digest, but absorbs decaying matter.”

He was indebted to Lady Dorothy Nevill for specimens of the curious *Utricularia montana*, which is not aquatic like the European species, but grows among the moss and *débris* on the branches of trees. To this species the following letter refers :]

C. Darwin to Lady Dorothy Nevill.

Down September 18 [1874].

DEAR LADY DOROTHY NEVILL,—I am so much obliged to you. I was so convinced that the bladders were with the leaves that I never thought of removing the moss, and this was very stupid of me. The great solid bladder-like swellings almost on the surface are wonderful objects, but are not the true bladders. These I found on the roots near the surface, and down to a depth of two inches in the sand. They are as transparent as glass, from $\frac{1}{10}$ to $\frac{1}{100}$ of an inch in size, and hollow. They have all the important points of structure of the bladders of the floating English species, and I felt confident I should find captured prey. And so I have to my delight in two bladders, with clear proof that they had absorbed food from the decaying mass. For *Utricularia* is a carrion-feeder, and not strictly carnivorous like *Drosera*.

The great solid bladder-like bodies, I believe, are reservoirs of water like a camel's stomach. As soon as I have made a few more observations, I mean to be so cruel as to give your plant no water, and observe whether the great

bladders shrink and contain air instead of water ; I shall then also wash all earth from all roots, and see whether there are true bladders for capturing subterranean insects down to the very bottom of the pot. Now shall you think me very greedy, if I say that supposing the species is not very precious, and you have several, will you give me one more plant, and if so, please to send it to "Orpington Station, S. E. R., to be forwarded by foot messenger."

I have hardly ever enjoyed a day more in my life than I have this day's work ; and this I owe to your Ladyship's great kindness.

The seeds are very curious monsters ; I fancy of some plant allied to *Medicago*, but I will show them to Dr. Hooker.

Your Ladyship's very gratefully,
CH. DARWIN.

C. Darwin to J. D. Hooker.

Down, September 30, 1874.

MY DEAR H.,—Your magnificent present of *Aldrovanda* has arrived quite safe. I have enjoyed greatly a good look at the shut leaves, one of which I cut open. It is an aquatic *Dionæa*, which has acquired some structures identical with those of *Utricularia* !

If the leaves open and I can transfer them open under the microscope, I will try some experiments, for mortal man cannot resist the temptation. If I cannot transfer, I will do nothing, for otherwise it would require hundreds of leaves.

You are a good man to give me such pleasure.

Yours affectionately,
C. DARWIN.

[The manuscript of 'Insectivorous Plants' was finished in March 1875. He seems to have been more than usually oppressed by the writing of this book, thus he wrote to Sir J. D. Hooker in February :—

“You ask about my book, and all that I can say is that I am ready to commit suicide ; I thought it was decently written, but find so much wants rewriting, that it will not be ready to go to printers for two months, and will then make a confoundedly big book. Murray will say that it is no use publishing in the middle of summer, so I do not know what will be the upshot ; but I begin to think that every one who publishes a book is a fool.”

The book was published on July 2nd, 1875, and 2700 copies were sold out of the edition of 3000.]

CHAPTER XIV.

THE 'POWER OF MOVEMENT IN PLANTS,' 1880.

[THE few sentences in the autobiographical chapter give with sufficient clearness the connection between the 'Power of Movement,' and one of the author's earlier books, that on 'Climbing Plants.' The central idea of the book is that the movements of plants in relation to light, gravitation, &c., are modifications of a spontaneous tendency to revolve or circumnutate, which is widely inherent in the growing parts of plants. This conception has not been generally adopted, and has not taken a place among the canons of orthodox physiology. The book has been treated by Professor Sachs with a few words of professorial contempt; and by Professor Wiesner it has been honoured by careful and generously expressed criticism.

Mr. Thiselton Dyer* has well said: "Whether this masterly conception of the unity of what has hitherto seemed a chaos of unrelated phenomena will be sustained, time alone will show. But no one can doubt the importance of what Mr. Darwin has done, in showing that for the future the phenomena of plant movement can and indeed must be studied from a single point of view."

The work was begun in the summer of 1877, after the publication of 'Different Forms of Flowers,' and by the autumn his enthusiasm for the subject was thoroughly established, and he wrote to Mr. Dyer: "I am all on fire at the work." At this time he was studying the movements of

* 'Charles Darwin' ('Nature' Series), p. 41.

cotyledons, in which the sleep of plants is to be observed in its simplest form; in the following spring he was trying to discover what useful purpose these sleep-movements could serve, and wrote to Sir Joseph Hooker (March 25th, 1878):—

"I think we have *proved* that the sleep of plants is to lessen the injury to the leaves from radiation. This has interested me much, and has cost us great labor, as it has been a problem since the time of Linnæus. But we have killed or badly injured a multitude of plants: N. B.—*Oxalis carnosa* was most valuable, but last night was killed."

His letters of this period do not give any connected account of the progress of the work. The two following are given as being characteristic of the author:]

C. Darwin to W. Thiselton Dyer.

Down, June 2, 1878.

MY DEAR DYER,—I remember saying that I should die a disgraced man if I did not observe a seedling Cactus and Cycas, and you have saved me from this horrible fate, as they move splendidly and normally. But I have two questions to ask: the Cycas observed was a huge seed in a broad and very shallow pot with cocoa-nut fibre as I suppose. It was named only Cycas. Was it *Cycas pectinata*? I suppose that I cannot be wrong in believing that what first appears above ground is a true leaf, for I can see no stem or axis. Lastly, you may remember that I said that we could not raise *Opuntia nigricans*; now I must confess to a piece of stupidity; one did come up, but my gardener and self stared at it, and concluded that it could not be a seedling *Opuntia*, but now that I have seen one of *O. basilaris*, I am sure it was; I observed it only casually, and saw movements, which makes me wish to observe carefully another. If you have any fruit, will Mr. Lynch* be so kind as to send one more?

I am working away like a slave at radicles [roots] and at

* Mr. R. I. Lynch, now Curator of the Botanic Garden at Cambridge, was at this time in the Royal Gardens, Kew.

movements of true leaves, for I have pretty well done with cotyledons. . . .

That was an *excellent* letter about the Gardens: * I had hoped that the agitation was over. Politicians are a poor truckling lot, for [they] must see the wretched effects of keeping the gardens open all day long.

Your ever troublesome friend,

CH. DARWIN.

C. Darwin to W. Thiselton Dyer.

4 Bryanston St., Portman Square,
November 21 [1878].

MY DEAR DYER,—I must thank you for all the wonderful trouble which you have taken about the seeds of *Impatiens*, and on scores of other occasions. It in truth makes me feel ashamed of myself, and I cannot help thinking: "Oh Lord, when he sees our book he will cry out, is this all for which I have helped so much!" In seriousness, I hope that we have made out some points, but I fear that we have done very little for the labour which we have expended on our work. We are here for a week for a little rest, which I needed.

If I remember right, November 30th, is the anniversary at the Royal, and I fear Sir Joseph must be almost at the last gasp. I shall be glad when he is no longer President.

Yours very sincerely,

CH. DARWIN.

[In the spring of the following year, 1879, when he was engaged in putting his results together, he wrote somewhat despondingly to Mr. Dyer: "I am overwhelmed with my notes, and almost too old to undertake the job which I have in hand—*i.e.*, movements of all kinds. Yet it is worse to be idle."

Later on in the year, when the work was approaching

* This refers to an attempt to induce the Government to open the Royal Gardens at Kew in the morning.

completion, he wrote to Prof. Carus (July 17, 1879), with respect to a translation :—

" Together with my son Francis, I am preparing a rather large volume on the general movements of Plants, and I think that we have made out a good many new points and views.

" I fear that our views will meet a good deal of opposition in Germany ; but we have been working very hard for some years at the subject.

" I shall be *much* pleased if you think the book worth translating, and proof-sheets shall be sent you, whenever they are ready."

In the autumn he was hard at work on the manuscript, and wrote to Dr. Gray (October 24, 1879) :—

" I have written a rather big book—more is the pity—on the movements of plants, and I am now just beginning to go over the MS. for the second time, which is a horrid bore."

Only the concluding part of the next letter refers to the 'Power of Movements':]

C. Darwin to A. De Candolle.

May 28, 1880.

MY DEAR SIR,—I am particularly obliged to you for having so kindly sent me your 'Phytographie ;' * for if I had merely seen it advertised, I should not have supposed that it could have concerned me. As it is, I have read with very great interest about a quarter, but will not delay longer thanking you. All that you say seems to me very clear and convincing, and as in all your writings I find a large number of philosophical remarks new to me, and no doubt shall find many more. They have recalled many a puzzle through which I passed when monographing the Cirripedia ; and your book in those days would have been quite invaluable to me. It has pleased me to find that I have always followed your

* A book on the methods of botanical research, more especially of systematic work.

plan of making notes on separate pieces of paper; I keep several scores of large portfolios, arranged on very thin shelves about two inches apart, fastened to the walls of my study, and each shelf has its proper name or title; and I can thus put at once every memorandum into its proper place. Your book will, I am sure, be very useful to many young students, and I shall beg my son Francis (who intends to devote himself to the physiology of plants) to read it carefully.

As for myself I am taking a fortnight's rest, after sending a pile of MS. to the printers, and it was a piece of good fortune that your book arrived as I was getting into my carriage, for I wanted something to read whilst away from home. My MS. relates to the movements of plants, and I think that I have succeeded in showing that all the more important great classes of movements are due to the modification of a kind of movement common to all parts of all plants from their earliest youth.

Pray give my kind remembrances to your son, and with my highest respect and best thanks,

Believe me, my dear Sir, yours very sincerely,

CHARLES DARWIN.

P.S.—It always pleases me to exalt plants in the organic scale, and if you will take the trouble to read my last chapter when my book (which will be sadly too big) is published and sent to you, I hope and think that you also will admire some of the beautiful adaptations by which seedling plants are enabled to perform their proper functions.

[The book was published on November 6, 1880, and 1500 copies were disposed of at Mr. Murray's sale. With regard to it he wrote to Sir J. D. Hooker (November 23):—

"Your note has pleased me much—for I did not expect that you would have had time to read *any* of it. Read the last chapter, and you will know the whole result, but without the evidence. The case, however, of radicles bending after exposure for an hour to geotropism, with their tips (or brains)

cut off is, I think, worth your reading (bottom of p. 525); it astounded me. The next most remarkable fact, as it appeared to me (p. 148), is the discrimination of the tip of the radicle between a slightly harder and softer object affixed on opposite sides of tip. But I will bother you no more about my book. The sensitiveness of seedlings to light is marvellous."

To another friend, Mr. Thiselton Dyer, he wrote (November 28, 1880):—

"Very many thanks for your most kind note, but you think too highly of our work, not but what this is very pleasant. . . . Many of the Germans are very contemptuous about making out the use of organs; but they may sneer the souls out of their bodies, and I for one shall think it the most interesting part of Natural History. Indeed you are greatly mistaken if you doubt for one moment on the very great value of your constant and most kind assistance to us."

The book was widely reviewed, and excited much interest among the general public. The following letter refers to a leading article in the *Times*, November 20, 1880:]

*C. Darwin to Mrs. Haliburton.**

Down, November 22, 1880.

MY DEAR SARAH,—You see how audaciously I begin; but I have always loved and shall ever love this name. Your letter has done more than please me, for its kindness has touched my heart. I often think of old days and of the delight of my visits to Woodhouse, and of the deep debt of gratitude which I owe to your father. It was very good of you to write. I had quite forgotten my old ambition about the Shrewsbury newspaper;† but I remember the pride

* Mrs. Haliburton was a daughter of my father's early friend, the late Mr. Owen, of Woodhouse.

† Mrs. Haliburton had reminded him of his saying as a boy that if Eddowes' newspaper ever alluded to him as "our deserving fellow-townsmen," his ambition would be amply gratified.

which I felt when I saw in a book about beetles the impressive words "captured by C. Darwin." Captured sounded so grand compared with caught. This seemed to me glory enough for any man! I do not know in the least what made the *Times* glorify me,* for it has sometimes pitched into me ferociously.

I should very much like to see you again, but you would find a visit here very dull, for we feel very old and have no amusement, and lead a solitary life. But we intend in a few weeks to spend a few days in London, and then if you have anything else to do in London, you would perhaps come and lunch with us.†

Believe me, my dear Sarah,

Yours gratefully and affectionately,

CHARLES DARWIN.

[The following letter was called forth by the publication of a volume devoted to the criticism of the 'Power of Movement in Plants' by an accomplished botanist, Dr. Julius Wiesner, Professor of Botany in the University of Vienna:]

C. Darwin to Julius Wiesner.

Down, October 25th, 1881.

MY DEAR SIR,—I have now finished your book,‡ and have understood the whole except a very few passages. In the first place, let me thank you cordially for the manner in which you have everywhere treated me. You have shown how a man may differ from another in the most decided manner, and yet express his difference with the most perfect courtesy. Not a few English and German naturalists might learn a useful lesson from your example; for the coarse language

* The following is the opening sentence of the leading article:—"Of all our living men of science none have laboured longer and to more splendid purpose than Mr. Darwin."

† My father had the pleasure of seeing Mrs. Haliburton at his brother's house in Queen Anne Street.

‡ 'Das Bewegungsvermögen der Pflanzen.' Vienna, 1881.

often used by scientific men towards each other does no good, and only degrades science.

I have been profoundly interested by your book, and some of your experiments are so beautiful, that I actually felt pleasure while being vivisected. It would take up too much space to discuss all the important topics in your book. I fear that you have quite upset the interpretation which I have given of the effects of cutting off the tips of horizontally extended roots, and of those laterally exposed to moisture; but I cannot persuade myself that the horizontal position of lateral branches and roots is due simply to their lessened power of growth. Nor when I think of my experiments with the cotyledons of *Phalaris*, can I give up the belief of the transmission of some stimulus due to light from the upper to the lower part. At p. 60 you have misunderstood my meaning, when you say that I believe that the effects from light are transmitted to a part which is not itself heliotropic. I never considered whether or not the short part beneath the ground was heliotropic; but I believe that with young seedlings the part which bends *near*, but *above* the ground is heliotropic, and I believe so from this part bending only moderately when the light is oblique, and bending rectangularly when the light is horizontal. Nevertheless the bending of this lower part, as I conclude from my experiments with opaque caps, is influenced by the action of light on the upper part. My opinion, however, on the above and many other points, signifies very little, for I have no doubt that your book will convince most botanists that I am wrong in all the points on which we differ.

Independently of the question of transmission, my mind is so full of facts leading me to believe that light, gravity, &c., act not in a direct manner on growth, but as stimuli, that I am quite unable to modify my judgment on this head. I could not understand the passage at p. 78, until I consulted my son George, who is a mathematician. He supposes that your objection is founded on the diffused light from the lamp illuminating both sides of the object, and not being reduced,

with increasing distance in the same ratio as the direct light ; but he doubts whether this *necessary* correction will account for the very little difference in the heliotropic curvature of the plants in the successive pots.

With respect to the sensitiveness of the tips of roots to contact, I cannot admit your view until it is proved that I am in error about bits of card attached by liquid gum causing movement ; whereas no movement was caused if the card remained separated from the tip by a layer of the liquid gum. The fact also of thicker and thinner bits of card attached on opposite sides of the same root by shellac, causing movement in one direction, has to be explained. You often speak of the tip having been injured ; but externally there was no sign of injury : and when the tip was plainly injured, the extreme part became curved *towards* the injured side. I can no more believe that the tip was injured by the bits of card, at least when attached by gum-water, than that the glands of *Drosera* are injured by a particle of thread or hair placed on it, or that the human tongue [is so] when it feels any such object.

About the most important subject in my book, namely circumnutation, I can only say that I feel utterly bewildered at the difference in our conclusions ; but I could not fully understand some parts which my son Francis will be able to translate to me when he returns home. The greater part of your book is beautifully clear.

Finally, I wish that I had enough strength and spirit to commence a fresh set of experiments, and publish the results, with a full recantation of my errors when convinced of them ; but I am too old for such an undertaking, nor do I suppose that I shall be able to do much, or any more, original work. I imagine that I see one possible source of error in your beautiful experiment of a plant rotating and exposed to a lateral light.

With high respect and with sincere thanks for the kind manner in which you have treated me and my mistakes, I remain, my dear Sir, yours sincerely,

CHARLES DARWIN.

CHAPTER XV.

MISCELLANEOUS BOTANICAL LETTERS.

1873-1882.

[THE present chapter contains a series of miscellaneous letters on botanical subjects. Some of them show my father's varied interests in botanical science, and others give account of researches which never reached completion.]

BLOOM ON LEAVES AND FRUIT.

[His researches into the meaning of the "bloom," or waxy coating found on many leaves, was one of those inquiries which remained unfinished at the time of his death. He amassed a quantity of notes on the subject, part of which I hope to publish at no distant date.*

One of his earliest letters on this subject was addressed in August, 1873, to Sir Joseph Hooker :—

"I want a little information from you, and if you do not yourself know, please to enquire of some of the wise men of Kew.

"Why are the leaves and fruit of so many plants protected by a thin layer of waxy matter (like the common cabbage), or with fine hair, so that when such leaves or fruit are im-

* A small instalment on the relation between bloom and the distribution of the stomata on leaves has appeared in the 'Journal of the Linnean Society,' 1886. Tschirsch (*Linnaea*, 1881) has published results identical with some which my father and myself obtained, viz. that bloom diminishes transpiration. The same fact was previously published by Garreau in 1850.

mersed in water they appear as if encased in thin glass? It is really a pretty sight to put a pod of the common pea, or a raspberry into water. I find several leaves are thus protected on the under surface and not on the upper.

"How can water injure the leaves if indeed this is at all the case?"

On this latter point he wrote to Sir Thomas Farrer:—

"I am now become mad about drops of water injuring leaves. Please ask Mr. Paine * whether he believes, *from his own experience*, that drops of water injure leaves or fruit in his conservatories. It is said that the drops act as burning-glasses; if this is true, they would not be at all injurious on cloudy days. As he is so acute a man, I should very much like to hear his opinion. I remember when I grew hot-house orchids I was cautioned not to wet their leaves; but I never then thought on the subject.

"I enjoyed my visit greatly with you, and I am very sure that all England could not afford a kinder and pleasanter host."

Some years later he took up the subject again, and wrote to Sir Joseph Hooker (May 25, 1877):—

"I have been looking over my old notes about the "bloom" on plants, and I think that the subject is well worth pursuing, though I am very doubtful of any success. Are you inclined to aid me on the mere chance of success, for without your aid I could do hardly anything?"

C. Darwin to Asa Gray.

Down, June 4 [1877].

. . . . I am now trying to make out the use or function of "bloom," or the waxy secretion on the leaves and fruit of plants, but am *very* doubtful whether I shall succeed. Can you give me any light? Are such plants commoner in warm than in colder climates? I ask because I often walk out in

* Sir Thomas Farrer's gardener

heavy rain, and the leaves of very few wild dicotyledons can be here seen with drops of water rolling off them like quicksilver. Whereas in my flower garden, greenhouse, and hot-houses there are several. Again, are bloom-protected plants common on your *dry* western plains? Hooker *thinks* that they are common at the Cape of Good Hope. It is a puzzle to me if they are common under very dry climates, and I find bloom very common on the Acacias and Eucalypti of Australia. Some of the Eucalypti which do not appear to be covered with bloom have the epidermis protected by a layer of some substance which is dissolved in boiling alcohol. Are there any bloom-protected leaves or fruit in the Arctic regions? If you can illuminate me, as you so often have done, pray do so; but otherwise do not bother yourself by answering.

Yours affectionately,

C. DARWIN.

C. Darwin to W. Thiselton Dyer.

Down, September 5 [1877].

MY DEAR DYER,—One word to thank you. I declare had it not been for your kindness, we should have broken down. As it is we have made out clearly that with some plants (chiefly succulent) the bloom checks evaporation—with some certainly prevents attacks of insects; with *some* sea-shore plants prevents injury from salt-water, and, I believe, with a few prevents injury from pure water resting on the leaves. This latter is as yet the most doubtful and the most interesting point in relation to the movements of plants. . . .

C. Darwin to F. Müller.

Down, July 4 [1881].

MY DEAR SIR,—Your kindness is unbounded, and I cannot tell you how much your last letter (May 31) has interested me. I have piles of notes about the effect of water resting on leaves, and their movements (as I supposed) to shake off the drops. But I have not looked over these notes

for a long time, and had come to think that perhaps my notion was mere fancy, but I had intended to begin experimenting as soon as I returned home ; and now with your *invaluable* letter about the position of the leaves of various plants during rain (I have one analogous case with *Acacia* from South Africa), I shall be stimulated to work in earnest.

VARIABILITY.

[The following letter refers to a subject on which my father felt the strongest interest :—the experimental investigation of the causes of variability. The experiments alluded to were to some extent planned out, and some preliminary work was begun in the direction indicated below, but the research was ultimately abandoned.]

*C. Darwin to J. H. Gilbert.**

Down, February 16, 1876.

MY DEAR SIR,—When I met you at the Linnean Society, you were so kind as to say that you would aid me with advice, and this will be of the utmost value to me and my son. I will first state my object, and hope that you will excuse a long letter. It is admitted by all naturalists that no problem is so perplexing as what causes almost every cultivated plant to vary, and no experiments as yet tried have thrown any light on the subject. Now for the last ten years I have been experimenting in crossing and self-fertilising plants ; and one indirect result has surprised me much ; namely, that by taking pains to cultivate plants in pots under glass during several successive generations, under nearly similar conditions, and by self-fertilising them in each generation, the color of the flowers often changes, and, what is very remarkable, they became in some of the most variable species, such as *Mimulus*, *Carnation*, &c., quite constant, like those of a wild species.

* Dr. Gilbert, F.R.S., joint author with Sir John Bennett Lawes of a long series of valuable researches in Scientific Agriculture.

This fact and several others have led me to the suspicion that the cause of variation must be in different substances absorbed from the soil by these plants when their powers of absorption are not interfered with by other plants with which they grow mingled in a state of nature. Therefore my son and I wish to grow plants in pots in soil entirely, or as nearly entirely as is possible, destitute of all matter which plants absorb, and then to give during several successive generations to several plants of the same species as different solutions as may be compatible with their life and health. And now, can you advise me how to make soil approximately free of all the substances which plants naturally absorb? I suppose white silver sand, sold for cleaning harness, &c., is nearly pure silica, but what am I to do for alumina? Without some alumina I imagine that it would be impossible to keep the soil damp and fit for the growth of plants. I presume that clay washed over and over again in water would still yield mineral matter to the carbonic acid secreted by the roots. I should want a good deal of soil, for it would be useless to experimentise unless we could fill from twenty to thirty moderately sized flower-pots every year. Can you suggest any plan? for unless you can it would, I fear, be useless for us to commence an attempt to discover whether variability depends at all on matter absorbed from the soil. After obtaining the requisite kind of soil, my notion is to water one set of plants with nitrate of potassium, another set with nitrate of sodium, and another with nitrate of lime, giving all as much phosphate of ammonia as they seemed to support, for I wish the plants to grow as luxuriantly as possible. The plants watered with nitrate of Na and of Ca would require, I suppose, some K; but perhaps they would get what is absolutely necessary from such soil as I should be forced to employ, and from the rain-water collected in tanks. I could use hard water from a deep well in the chalk, but then all the plants would get lime. If the plants to which I give Nitrate of Na and of Ca would not grow I might give them a little alum.

I am well aware how very ignorant I am, and how crude

my notions are ; and if you could suggest any other solutions by which plants would be likely to be affected it would be a very great kindness. I suppose that there are no organic fluids which plants would absorb, and which I could procure ?

I must trust to your kindness to excuse me for troubling you at such length, and,

I remain, dear Sir, yours sincerely,

CHARLES DARWIN.

[The next letter to Professor Semper* bears on the same subject :]

From C. Darwin to K. Semper.

Down, July 19, 1881.

MY DEAR PROFESSOR SEMPER,—I have been much pleased to receive your letter, but I did not expect you to answer my former one. . . . I cannot remember what I wrote to you, but I am sure that it must have expressed the interest which I felt in reading your book.† I thought that you attributed too much weight to the *direct* action of the environment ; but whether I said so I know not, for without being asked I should have thought it presumptuous to have criticised your book, nor should I now say so had I not during the last few days been struck with Professor Hoffmann's review of his own work in the 'Botanische Zeitung,' on the variability of plants ; and it is really surprising how little effect he produced by cultivating certain plants under unnatural conditions, as the presence of salt, lime, zinc, &c., &c., during *several* generations. Plants, moreover, were selected which were the most likely to vary under such conditions, judging from the existence of closely-allied forms adapted for these conditions. No doubt I originally attributed too little weight

* Professor of Zoology at Würzburg.

† Published in the 'International Scientific Series,' in 1881, under the title, 'The Natural Conditions of Existence as they affect Animal Life.'

to the direct action of conditions, but Hoffmann's paper has staggered me. Perhaps hundreds of generations of exposure are necessary. It is a most perplexing subject. I wish I was not so old, and had more strength, for I see lines of research to follow. Hoffmann even doubts whether plants vary more under cultivation than in their native home and under their natural conditions. If so, the astonishing variations of almost all cultivated plants must be due to selection and breeding from the varying individuals. This idea crossed my mind many years ago, but I was afraid to publish it, as I thought that people would say, "how he does exaggerate the importance of selection."

I still *must* believe that changed conditions give the impulse to variability, but that they act *in most cases* in a very indirect manner. But, as I said, it is a most perplexing problem. Pray forgive me for writing at such length; I had no intention of doing so when I sat down to write.

I am extremely sorry to hear, for your own sake and for that of Science, that you are so hard worked, and that so much of your time is consumed in official labour.

Pray believe me, dear Professor Semper,

Yours sincerely,

CHARLES DARWIN.

GALLS.

[Shortly before his death, my father began to experimentise on the possibility of producing galls artificially. A letter to Sir J. D. Hooker (Nov. 3, 1880) shows the interest which he felt in the question:—

"I was delighted with Paget's Essay; * I hear that he has occasionally attended to this subject from his youth I am very glad he has called attention to galls: this has always seemed to me a profoundly interesting subject; and if I had been younger would take it up."

His interest in this subject was connected with his ever-

* 'Disease in Plants,' by Sir James Paget.—See *Gardeners' Chronicle*, 1880.

present wish to learn something of the causes of variation. He imagined to himself wonderful galls caused to appear on the ovaries of plants, and by these means he thought it possible that the seed might be influenced, and thus new varieties arise. He made a considerable number of experiments by injecting various reagents into the tissues of leaves, and with some slight indications of success.]

AGGREGATION.

[The following letter gives an idea of the subject of the last of his published papers.* The appearances which he observed in leaves and roots attracted him, on account of their relation to the phenomena of aggregation which had so deeply interested him when he was at work on *Drosera* :]

C. Darwin to S. H. Vines.†

Down, November 1, 1881.

MY DEAR MR. VINES,—As I know how busy you are, it is a great shame to trouble you. But you are so rich in chemical knowledge about plants, and I am so poor, that I appeal to your charity as a pauper. My question is—Do you know of any solid substance in the cells of plants which glycerine and water dissolves? But you will understand my perplexity better if I give you the facts : I mentioned to you that if a plant of *Euphorbia peplus* is gently dug up and the roots placed for a short time in a weak solution (1 to 10,000 of water, suffices in 24 hours) of carbonate of ammonia the (generally) alternate longitudinal rows of cells in every rootlet, from the root-cap up to the very top of the root (but not as far as I have yet seen in the green stem) become filled with translucent, brownish grains of matter. These rounded grains often cohere and even become confluent. Pure phosphate and nitrate of ammonia produce (though more slowly) the same effect, as does pure carbonate of soda.

* 'Journal of the Linnean Society.' Vol. xix., 1882, pp. 239 and 262.

† Reader in Botany in the University of Cambridge.

Now, if slices of root under a cover-glass are irrigated with glycerine and water, every one of the innumerable grains in the cells disappear after some hours. What am I to think of this?

Forgive me for bothering you to such an extent; but I must mention that if the roots are dipped in boiling water there is no deposition of matter, and carbonate of ammonia afterwards produces no effect. I should state that I now find that the granular matter is formed in the cells immediately beneath the thin epidermis, and a few other cells near the vascular tissue. If the granules consisted of living protoplasm (but I can see no traces of movement in them), then I should infer that the glycerine killed them and aggregation ceased with the diffusion of invisibly minute particles, for I have seen an analogous phenomenon in *Drosera*.

If you can aid me, pray do so, and anyhow forgive me.

Yours very sincerely,

CH. DARWIN.

MR. TORBITT'S EXPERIMENTS ON THE POTATO-DISEASE.

[Mr. James Torbitt, of Belfast, has been engaged for the last twelve years in the difficult undertaking, in which he has been to a large extent successful, of raising fungus-proof varieties of the potato. My father felt great interest in Mr. Torbitt's work, and corresponded with him from 1876 onwards. The following letter, giving a clear account of Mr. Torbitt's method and of my father's opinion of the probability of its success, was written with the idea that Government aid for the work might possibly be obtainable :]

C. Darwin to T. H. Farrer.

Down, March 2, 1878.

MY DEAR FARRER,—Mr. Torbitt's plan of overcoming the potato-disease seems to me by far the best which has ever been suggested. It consists, as you know from his printed

letter, of rearing a vast number of seedlings from cross-fertilised parents, exposing them to infection, ruthlessly destroying all that suffer, saving those which resist best, and repeating the process in successive seminal generations. My belief in the probability of good results from this process rests on the fact of all characters whatever occasionally varying. It is known, for instance, that certain species and varieties of the vine resist phylloxera better than others. Andrew Knight found in one variety or species of the apple which was not in the least attacked by coccus, and another variety has been observed in South Australia. Certain varieties of the peach resist mildew, and several other such cases could be given. Therefore there is no great improbability in a new variety of potato arising which would resist the fungus completely, or at least much better than any existing variety. With respect to the cross-fertilisation of two distinct seedling plants, it has been ascertained that the offspring thus raised inherit much more vigorous constitutions and generally are more prolific than seedlings from self-fertilised parents. It is also probable that cross-fertilisation would be especially valuable in the case of the potato, as there is reason to believe that the flowers are seldom crossed by our native insects; and some varieties are absolutely sterile unless fertilised with pollen from a distinct variety. There is some evidence that the good effects from a cross are transmitted for several generations; it would not, therefore be necessary to cross-fertilise the seedlings in each generation, though this would be desirable, as it is almost certain that a greater number of seeds would thus be obtained. It should be remembered that a cross between plants raised from the tubers of the same plant, though growing on distinct roots, does no more good than a cross between flowers on the same individual. Considering the whole subject, it appears to me that it would be a national misfortune if the cross-fertilised seeds in Mr. Torbitt's possession produced by parents which have already shown some power of resisting the disease, are

not utilised by the Government, or some public body, and the process of selection continued during several more generations.

Should the Agricultural Society undertake the work, Mr. Torbitt's knowledge gained by experience would be especially valuable; and an outline of the plan is given in his printed letter. It would be necessary that all the tubers produced by each plant should be collected separately, and carefully examined in each succeeding generation.

It would be advisable that some kind of potato eminently liable to the disease should be planted in considerable numbers near the seedlings so as to infect them.

Altogether the trial would be one requiring much care and extreme patience, as I know from experience with analogous work, and it may be feared that it would be difficult to find any one who would pursue the experiment with sufficient energy. It seems, therefore, to me highly desirable that Mr. Torbitt should be aided with some small grant so as to continue the work himself.

Judging from his reports, his efforts have already been crowned in so short a time with more success than could have been anticipated; and I think you will agree with me, that any one who raises a fungus-proof potato will be a public benefactor of no common kind.

My dear Farrer, yours sincerely,

CHARLES DARWIN.

[After further consultation with Sir Thomas Farrer and with Mr. Caird, my father became convinced that it was hopeless to attempt to obtain Government aid. He wrote to Mr. Torbitt to this effect, adding, "it would be less trouble to get up a subscription from a few rich leading agriculturists than from Government. This plan I think you cannot object to, as you have asked nothing, and will have nothing whatever to do with the subscription. In fact, the affair is, in my opinion, a compliment to you." The idea here broached was carried out, and Mr. Torbitt was enabled to continue his work

by the aid of a sum to which Sir T. Farrer, Mr. Caird, my father, and a few friends, subscribed.

My father's sympathy and encouragement were highly valued by Mr. Torbitt, who tells me that without them he should long ago have given up his attempt. A few extracts will illustrate my father's fellow feeling with Mr. Torbitt's energy and perseverance :—

"I admire your indomitable spirit. If any one ever deserved success, you do so, and I keep to my original opinion that you have a very good chance of raising a fungus-proof variety of the potato.

"A pioneer in a new undertaking is sure to meet with many disappointments, so I hope that you will keep up your courage, though we have done so very little for you."

Mr. Torbitt tells me that he still (1887) succeeds in raising varieties possessing well-marked powers of resisting disease; but this immunity is not permanent, and, after some years, the varieties become liable to the attacks of the fungus.]

THE KEW INDEX OF PLANT-NAMES, OR 'NOMENCLATOR DARWINIANUS'.

[Some account of my father's connection with the Index of Plant-names now (1887) in course of preparation at Kew will be found in Mr. B. Daydon Jackson's paper in the 'Journal of Botany,' 1887, p. 151. Mr. Jackson quotes the following statement by Sir J. D. Hooker :—

"Shortly before his death, Mr. Charles Darwin informed Sir Joseph Hooker that it was his intention to devote a considerable sum of money annually for some years in aid or furtherance of some work or works of practical utility to biological science, and to make provisions in his will in the event of these not being completed during his lifetime.

"Amongst other objects connected with botanical science, Mr. Darwin regarded with especial interest the importance of a complete index to the names and authors of the genera and

species of plants known to botanists, together with their native countries. Steudel's 'Nomenclator' is the only existing work of this nature, and although now nearly half a century old, Mr. Darwin had found it of great aid in his own researches. It has been indispensable to every botanical institution, whether as a list of all known flowering plants, as an indication of their authors, or as a digest of botanical geography."

Since 1840, when the 'Nomenclator' was published, the number of described plants may be said to have doubled, so that the 'Nomenclator' is now seriously below the requirements of botanical work. To remedy this want, the 'Nomenclator' has been from time to time posted up in an interleaved copy in the Herbarium at Kew, by the help of "funds supplied by private liberality." *

My father, like other botanists, had as Sir Joseph Hooker points out, experienced the value of Steudel's work. He obtained plants from all sorts of sources, which were often incorrectly named, and he felt the necessity of adhering to the accepted nomenclature, so that he might convey to other workers precise indications as to the plants which he had studied. It was also frequently a matter of importance to him to know the native country of his experimental plants. Thus it was natural that he should recognize the desirability of completing and publishing the interleaved volume at Kew. The wish to help in this object was heightened by the admiration he felt for the results for which the world has to thank the Royal Gardens at Kew, and by his gratitude for the invaluable aid which for so many years he received from its Director and his staff. He expressly stated that it was his wish "to aid in some way the scientific work carried on at the Royal Gardens" †—which induced him to offer to supply funds for the completion of the Kew 'Nomenclator.'

* Kew Gardens Report, 1881, p. 62.

† See 'Nature,' January 5, 1882.

The following passage, for which I am indebted to Professor Judd, is of much interest, as illustrating the motives that actuated my father in this matter. Professor Judd writes :—

“On the occasion of my last visit to him, he told me that his income having recently greatly increased, while his wants remained the same, he was most anxious to devote what he could spare to the advancement of Geology or Biology. He dwelt in the most touching manner on the fact that he owed so much happiness and fame to the natural-history sciences, which had been the solace of what might have been a painful existence ;—and he begged me, if I knew of any research which could be aided by a grant of a few hundreds of pounds, to let him know, as it would be a delight to him to feel that he was helping in promoting the progress of science. He informed me at the same time that he was making the same suggestion to Sir Joseph Hooker and Professor Huxley with respect to Botany and Zoology respectively. I was much impressed by the earnestness, and, indeed, deep emotion, with which he spoke of his indebtedness to Science, and his desire to promote its interests.”

Sir Joseph Hooker was asked by my father “to take into consideration, with the aid of the botanical staff at Kew and the late Mr. Bentham, the extent and scope of the proposed work, and to suggest the best means of having it executed. In doing this, Sir Joseph had further the advantage of the great knowledge and experience of Professor Asa Gray, of Cambridge, U.S.A., and of Mr. John Ball, F.R.S.”*

The plan of the proposed work having been carefully considered, Sir Joseph Hooker was able to confide its elaboration in detail to Mr. B. Daydon Jackson, Secretary of the Linnean Society, whose extensive knowledge of botanical literature qualifies him for the task. My father's original idea of producing a modern edition of Steudel's ‘*Nomenclator*’ has been practically abandoned, the aim now kept in

* ‘*Journal of Botany*,’ *loc. cit.*

view is rather to construct a list of genera and species (with references) founded on Bentham and Hooker's 'Genera Plantarum.' The colossal nature of the work in progress at Kew may be estimated by the fact that the manuscript of the 'Index' is at the present time (1887) believed to weigh more than a ton. Under Sir Joseph Hooker's supervision the work goes steadily forward, being carried out with admirable zeal by Mr. Jackson, who devotes himself unsparingly to the enterprise, in which, too, he has the advantage of the active interest in the work felt by Professor Oliver and Mr. Thistelton Dyer.

The Kew 'Index,' which will, in all probability, be ready to go to press in four or five years, will be a fitting memorial of my father: and his share in its completion illustrates a part of his character—his ready sympathy with work outside his own lines of investigation—and his respect for minute and patient labour in all branches of science.]

CHAPTER XVI.

CONCLUSION.

SOME idea of the general course of my father's health may have been gathered from the letters given in the preceding pages. The subject of health appears more prominently than is often necessary in a Biography, because it was, unfortunately, so real an element in determining the outward form of his life.

During the last ten years of his life the condition of his health was a cause of satisfaction and hope to his family. His condition showed signs of amendment in several particulars. He suffered less distress and discomfort, and was able to work more steadily. Something has been already said of Dr. Bence Jones's treatment, from which my father certainly derived benefit. In later years he became a patient of Sir Andrew Clark, under whose care he improved greatly in general health. It was not only for his generously rendered service that my father felt a debt of gratitude towards Sir Andrew Clark. He owed to his cheering personal influence an often-repeated encouragement, which latterly added something real to his happiness, and he found sincere pleasure in Sir Andrew's friendship and kindness towards himself and his children.

Scattered through the past pages are one or two references to pain or uneasiness felt in the region of the heart. How far these indicate that the heart was affected early in life, I cannot pretend to say; in any case it is certain that he had no serious or permanent trouble of this nature until

shortly before his death. In spite of the general improvement in his health, which has been above alluded to, there was a certain loss of physical vigour occasionally apparent during the last few years of his life. This is illustrated by a sentence in a letter to his old friend Sir James Sullivan, written on January 10, 1879: "My scientific work tires me more than it used to do, but I have nothing else to do, and whether one is worn out a year or two sooner or later signifies but little."

A similar feeling is shown in a letter to Sir J. D. Hooker of June 15, 1881. My father was staying at Patterdale, and wrote: "I am rather despondent about myself . . . I have not the heart or strength to begin any investigation lasting years, which is the only thing which I enjoy, and I have no little jobs which I can do."

In July, 1881, he wrote to Mr. Wallace, "We have just returned home after spending five weeks on Ullswater; the scenery is quite charming, but I cannot walk, and everything tires me, even seeing scenery . . . What I shall do with my few remaining years of life I can hardly tell. I have everything to make me happy and contented, but life has become very wearisome to me." He was, however, able to do a good deal of work, and that of a trying sort,* during the autumn of 1881, but towards the end of the year he was clearly in need of rest; and during the winter was in a lower condition than was usual with him.

On December 13 he went for a week to his daughter's house in Bryanston Street. During his stay in London he went to call on Mr. Romanes, and was seized when on the door-step with an attack apparently of the same kind as those which afterwards became so frequent. The rest of the incident, which I give in Mr. Romanes' words, is interesting too from a different point of view, as giving one more illustration of my father's scrupulous consideration for others:—

* On the action of carbonate of ammonia on roots and leaves.

"I happened to be out, but my butler, observing that Mr. Darwin was ill, asked him to come in. He said he would prefer going home, and although the butler urged him to wait at least until a cab could be fetched, he said he would rather not give so much trouble. For the same reason he refused to allow the butler to accompany him. Accordingly he watched him walking with difficulty towards the direction in which cabs were to be met with, and saw that, when he had got about three hundred yards from the house, he staggered and caught hold of the park-railings as if to prevent himself from falling. The butler therefore hastened to his assistance, but after a few seconds saw him turn round with the evident purpose of retracing his steps to my house. However, after he had returned part of the way he seems to have felt better, for he again changed his mind, and proceeded to find a cab."

During the last week of February and in the beginning of March, attacks of pain in the region of the heart, with irregularity of the pulse, became frequent, coming on indeed nearly every afternoon. A seizure of this sort occurred about March 7, when he was walking alone at a short distance from the house; he got home with difficulty, and this was the last time that he was able to reach his favourite 'Sand-walk.' Shortly after this, his illness became obviously more serious and alarming, and he was seen by Sir Andrew Clark, whose treatment was continued by Dr. Norman Moore, of St. Bartholomew's Hospital, and Mr. Alfrey, of St. Mary Cray. He suffered from distressing sensations of exhaustion and faintness, and seemed to recognise with deep depression the fact that his working days were over. He gradually recovered from this condition, and became more cheerful and hopeful, as is shown in the following letter to Mr. Huxley, who was anxious that my father should have closer medical supervision than the existing arrangements allowed :

Down, March 27, 1882.

"MY DEAR HUXLEY,—Your most kind letter has been a real cordial to me. I have felt better to-day than for three weeks, and have felt as yet no pain. Your plan seems an excellent one, and I will probably act upon it, unless I get very much better. Dr. Clark's kindness is unbounded to me, but he is too busy to come here. Once again, accept my cordial thanks, my dear old friend. I wish to God there were more automata* in the world like you.

Ever yours,
CH. DARWIN."

The allusion to Sir Andrew Clark requires a word of explanation. Sir Andrew Clark himself was ever ready to devote himself to my father, who, however, could not endure the thought of sending for him, knowing how severely his great practice taxed his strength.

No especial change occurred during the beginning of April, but on Saturday 15th he was seized with giddiness while sitting at dinner in the evening, and fainted in an attempt to reach his sofa. On the 17th he was again better, and in my temporary absence recorded for me the progress of an experiment in which I was engaged. During the night of April 18th, about a quarter to twelve, he had a severe attack and passed into a faint, from which he was brought back to consciousness with great difficulty. He seemed to recognise the approach of death, and said, "I am not the least afraid to die." All the next morning he suffered from terrible nausea and faintness, and hardly rallied before the end came.

He died at about four o'clock on Wednesday, April 19th, 1882, in the seventy-fourth year of his age.

I close the record of my father's life with a few words of

* The allusion is to Mr. Huxley's address 'On the Hypothesis that Animals are Automata, and its History,' given at the Belfast meeting of the British Association in 1874, and republished in 'Science and Culture.'

retrospect added to the manuscript of his 'Autobiography' in 1879 :—

“As for myself, I believe that I have acted rightly in steadily following, and devoting my life to Science. I feel no remorse from having committed any great sin, but have often and often regretted that I have not done more direct good to my fellow creatures.”

APPENDIX I.

THE FUNERAL IN WESTMINSTER ABBEY.

ON the Friday succeeding my father's death, the following letter, signed by twenty members of Parliament, was addressed to Dr. Bradley, Dean of Westminster:—

HOUSE OF COMMONS, April 21, 1882.

VERY REV. SIR,—We hope you will not think we are taking a liberty if we venture to suggest that it would be acceptable to a very large number of our fellow-countrymen of all classes and opinions that our illustrious countryman, Mr. Darwin, should be buried in Westminster Abbey.

We remain, your obedient servants,

JOHN LUBBOCK,
NEVIL STOREY MASKELYNE,
A. J. MUNDELLA,
G. O. TREVELYAN,
LYON PLAYFAIR,
CHARLES W. DILKE,
DAVID WEDDERBURN,
ARTHUR RUSSEL,
HORACE DAVEY,
BENJAMIN ARMITAGE,

RICHARD B. MARTIN,
FRANCIS W. BUXTON,
E. L. STANLEY,
HENRY BROADHURST,
JOHN BARRAN,
J. F. CHEETHAM,
H. S. HOLLAND,
H. CAMPBELL-BANNERMAN,
CHARLES BRUCE,
RICHARD FORT.

The Dean was abroad at the time, and telegraphed his cordial acquiescence.

The family had desired that my father should be buried at Down: with regard to their wishes, Sir John Lubbock wrote:—

HOUSE OF COMMONS, April 25, 1882.

MY DEAR DARWIN,—I quite sympathise with your feeling, and personally I should greatly have preferred that your father should have rested in Down amongst us all. It is, I am sure, quite understood that the initiative was not taken by you. Still, from a national point of view, it is clearly right that he should be buried in the Abbey. I esteem it a great privilege to be allowed to accompany my dear master to the grave.

Believe me, yours most sincerely,

JOHN LUBBOCK.

W. E. DARWIN, ESQ.

The family gave up their first-formed plans, and the funeral took place in Westminster Abbey on April 26th. The pall-bearers were:—

SIR JOHN LUBBOCK,

Mr. HUXLEY,

Mr. JAMES RUSSELL LOWELL
(American Minister),

CANON FARRAR,

SIR J. D. HOOKER,

Mr. WM. SPOTTISWOODE
(President of the Royal
Society),

Mr. A. R. WALLACE,

The DUKE OF DEVONSHIRE,

The EARL OF DERBY,

The DUKE OF ARGYLL.

The funeral was attended by the representatives of France, Germany, Italy, Spain, Russia, and by those of the Universities, and learned Societies, as well as by large numbers of personal friends and distinguished men.

The grave is in the North aisle of the Nave, close to the angle of the choir-screen, and a few feet from the grave of Sir Isaac Newton. The stone bears the inscription—

CHARLES ROBERT DARWIN.

Born 12 February, 1809.

Died 19 April, 1882.

APPENDIX II.

I.—LIST OF WORKS BY C. DARWIN.

- Narrative of the Surveying Voyages of Her Majesty's Ships 'Adventure' and 'Beagle' between the years 1826 and 1836, describing their examination of the Southern shores of South America, and the 'Beagle's' circumnavigation of the globe. Vol. iii. Journal and Remarks, 1832-1836. By Charles Darwin. 8vo. London, 1839.
- Journal of Researches into the Natural History and Geology of the countries visited during the Voyage of H.M.S. 'Beagle' round the world, under the command of Capt. Fitz-Roy, R.N. 2nd edition, corrected, with additions. 8vo. London, 1845. (Colonial and Home Library.)
- A Naturalist's Voyage. Journal of Researches, &c. 8vo. London, 1860. [Contains a postscript dated Feb. 1, 1860.]
- Zoology of the Voyage of H.M.S. 'Beagle.' Edited and superintended by Charles Darwin. Part I. Fossil Mammalia, by Richard Owen. With a Geological Introduction, by Charles Darwin. 4to. London, 1840.
- Part II. Mammalia, by George R. Waterhouse. With a notice of their habits and ranges, by Charles Darwin. 4to. London, 1839.
- Part III. Birds, by John Gould. An "Advertisement" (2 pp.) states that in consequence of Mr. Gould's having left England for Australia, many descriptions were supplied by Mr. G. R. Gray of the British Museum. 4to. London, 1841.
- Part IV. Fish, by Rev. Leonard Jenyns. 4to. London, 1842.
- Part V. Reptiles, by Thomas Bell. 4to. London, 1843.

- The Structure and Distribution of Coral Reefs. Being the First Part of the Geology of the Voyage of the 'Beagle.' 8vo. London, 1842.
- The Structure and Distribution of Coral Reefs. 2nd edition. 8vo. London, 1874.
- Geological Observations on the Volcanic Islands, visited during the Voyage of H.M.S. 'Beagle.' Being the Second Part of the Geology of the Voyage of the 'Beagle.' 8vo. London, 1844.
- Geological Observations on South America. Being the Third Part of the Geology of the Voyage of the 'Beagle.' 8vo. London, 1846.
- Geological Observations on the Volcanic Islands and parts of South America visited during the Voyage of H.M.S. 'Beagle.' 2nd edition. 8vo. London, 1876.
- A Monograph of the Fossil Lepadidæ; or, Pedunculated Cirripedes of Great Britain. 4to. London, 1851. (Palæontographical Society.)
- A Monograph of the Sub-class Cirripedia, with Figures of all the Species. The Lepadidæ; or, Pedunculated Cirripedes. 8vo. London, 1851. (Ray Society.)
- The Balanidæ (or Sessile Cirripedes); the Verrucidæ, &c. 8vo. London, 1854. (Ray Society.)
- A Monograph of the Fossil Balanidæ and Verrucidæ of Great Britain. 4to. London, 1854. (Palæontographical Society.)
- On the Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. 8vo. London, 1859. (Dated Oct. 1st, 1859, published Nov. 24, 1859.)
- Fifth thousand. 8vo. London, 1860.
- Third edition, with additions and corrections. (Seventh thousand.) 8vo. London, 1861. (Dated March, 1861.)
- Fourth edition, with additions and corrections. (Eighth thousand.) 8vo. London, 1866. (Dated June, 1866.)
- Fifth edition, with additions and corrections. (Tenth thousand.) 8vo. London, 1869. (Dated May, 1869.)
- Sixth edition, with additions and corrections to 1872. (Twenty-fourth thousand.) 8vo. London, 1882. (Dated Jan., 1872.)
- On the various contrivances by which Orchids are fertilised by Insects. 8vo. London, 1862.
- Second edition. 8vo. London, 1877. [In the second edition the word "On" is omitted from the title.]

- The Movements and Habits of Climbing Plants. Second edition. 8vo. London, 1875. [First appeared in the ninth volume of the 'Journal of the Linnean Society.']
- The Variation of Animals and Plants under Domestication. 2 vols. 8vo. London, 1868.
- Second edition, revised. 2 vols. 8vo. London, 1875.
- The Descent of Man, and Selection in Relation to Sex. 2 vols. 8vo. London, 1871.
- Second edition. 8vo. London, 1874. (In 1 vol.)
- The Expression of the Emotions in Man and Animals. 8vo. London, 1872.
- Insectivorous Plants. 8vo. London, 1875.
- The Effects of Cross and Self Fertilisation in the Vegetable Kingdom. 8vo. London, 1876.
- Second edition. 8vo. London, 1878.
- The different Forms of Flowers on Plants of the same Species. 8vo. London, 1877.
- Second edition. 8vo. London, 1880.
- The Power of Movement in Plants. By Charles Darwin, assisted by Francis Darwin. 8vo. London, 1880.
- The Formation of Vegetable Mould, through the Action of Worms, with Observations on their Habits. 8vo. London, 1881.

II.—LIST OF BOOKS CONTAINING CONTRIBUTIONS BY C. DARWIN.

- A Manual of scientific enquiry; prepared for the use of Her Majesty's Navy; and adapted for travellers in general. Ed. by Sir John F. W. Herschel, Bart. 8vo. London, 1849. (Section VI. Geology. By Charles Darwin.)
- Memoir of the Rev. John Stevens Henslow. By the Rev. Leonard Jenyns. 8vo. London, 1862. [In Chapter III., Recollections by C. Darwin.]
- A letter (1876) on the 'Drift' near Southampton, published in Prof. J. Geikie's 'Prehistoric Europe.'
- Flowers and their unbidden guests. By A. Kerner. With a Prefatory Letter by Charles Darwin. The translation revised and edited by W. Ogle. 8vo. London, 1878.
- Erasmus Darwin. By Ernst Krause. Translated from the German by W. S. Dallas. With a preliminary notice by Charles Darwin. 8vo. London, 1879.
- Studies in the Theory of Descent. By Aug. Weismann. Translated

and edited by Raphael Meldola. With a Prefatory Notice by Charles Darwin. 8vo. London, 1880—.

The Fertilisation of Flowers. By Hermann Müller. Translated and edited by D'Arcy W. Thompson. With a Preface by Charles Darwin. 8vo. London, 1883.

Mental Evolution in Animals. By G. J. Romanes. With a posthumous essay on instinct by Charles Darwin, 1883. [Also published in the Journal of the Linnean Society.]

Some Notes on a curious habit of male humble bees were sent to Prof. Hermann Müller, of Lippstadt, who had permission from Mr. Darwin to make what use he pleased of them. After Müller's death the Notes were given by his son to Dr. E. Krause, who published them under the title, "Ueber die Wege der Hummel-Männchen" in his book, 'Gesammelte kleinere Schriften von Charles Darwin' (1886).

III.—LIST OF SCIENTIFIC PAPERS, INCLUDING A SELECTION OF LETTERS AND SHORT COMMUNICATIONS TO SCIENTIFIC JOURNALS.

Letters to Professor Henslow, read by him at the meeting of the Cambridge Philosophical Society, held Nov. 16, 1835. 31 pp. 8vo. Privately printed for distribution among the members of the Society.

Geological Notes made during a survey of the East and West Coasts of South America in the years 1832, 1833, 1834, and 1835; with an account of a transverse section of the Cordilleras of the Andes between Valparaiso and Mendoza. [Read Nov. 18, 1835.] Geol. Soc. Proc. ii. 1838, pp. 210–212. [This Paper is incorrectly described in Geol. Soc. Proc. ii., p. 210 as follows:—"Geological notes, &c., by F. Darwin, Esq., of St. John's College, Cambridge: communicated by Prof. Sedgwick." It is Indexed under C. Darwin.]

Notes upon the Rhea Americana. Zool. Soc. Proc., Part v. 1837, pp. 35–36.

Observations of proofs of recent elevation on the coast of Chili, made during the survey of H.M.S. "Beagle," commanded by Capt. FitzRoy. [1837.] Geol. Soc. Proc. ii. 1838, pp. 446–449.

A sketch of the deposits containing extinct Mammalia in the neighbourhood of the Plata. [1837.] Geol. Soc. Proc. ii. 1838, pp. 542–544.

On certain areas of elevation and subsidence in the Pacific and In-

- dian oceans, as deduced from the study of coral formations. [1837.] Geol. Soc. Proc. ii. 1838, pp. 552-554.
- On the Formation of Mould. [Read Nov. 1, 1837.] Geol. Soc. Proc. ii. 1838, pp. 574-576; Geol. Soc. Trans. v. 1840, pp. 505-510.
- On the Connexion of certain Volcanic Phenomena and on the formation of mountain-chains and the effects of continental elevations. [Read March 7, 1838.] Geol. Soc. Proc. ii. 1838, pp. 654-660; Geol. Soc. Trans. v. 1840, pp. 601-632. [In the Society's Transactions the wording of the title is slightly different.]
- Origin of saliferous deposits. Salt Lakes of Patagonia and La Plata. Geol. Soc. Journ. ii. (Part ii.), 1838, pp. 127-128.
- Note on a Rock seen on an Iceberg in 16° South Latitude. Geogr. Soc. Journ. ix. 1839, pp. 528-529.
- Observations on the Parallel Roads of Glen Roy, and of other parts of Lochaber in Scotland, with an attempt to prove that they are of marine origin. Phil. Trans. 1839, pp. 39-82.
- On a remarkable Bar of Sandstone off Pernambuco, on the Coast of Brazil. Phil. Mag. xix. 1841, pp. 257-260.
- On the Distribution of the Erratic Boulders and on the Contemporaneous Unstratified Deposits of South America. [1841.] Geol. Soc. Proc. iii. 1842, pp. 425-430; Geol. Soc. Trans. vi. 1842, pp. 415-432.
- Notes on the Effects produced by the Ancient Glaciers of Caernarvonshire, and on the Boulders transported by Floating Ice. London Philosoph. Mag. vol. xxi. p. 180. 1842.
- Remarks on the preceding paper, in a Letter from Charles Darwin, Esq., to Mr. Maclaren. Edinb. New Phil. Journ. xxxiv. 1843, pp. 47-50. [The "preceding" paper is: "On Coral Islands and Reefs as described by Mr. Darwin. By Charles Maclaren, Esq., F.R.S.E."]
- Observations on the Structure and Propagation of the genus *Sagitta*. Ann. and Mag. Nat. Hist. xiii. 1844, pp. 1-6.
- Brief Descriptions of several Terrestrial *Planaria*, and of some remarkable Marine Species, with an Account of their Habits. Ann. and Mag. Nat. Hist. xiv. 1844, pp. 241-251.
- An account of the Fine Dust which often falls on Vessels in the Atlantic Ocean. Geol. Soc. Journ. ii. 1846, pp. 26-30.
- On the Geology of the Falkland Islands. Geol. Soc. Journ. ii. 1846, pp. 267-274.
- A review of Waterhouse's 'Natural History of the Mammalia.' [Not signed.] Ann. and Mag. of Nat. Hist. 1847. Vol. xix. p. 53.

On the Transportal of Erratic Boulders from a lower to a higher level. Geol. Soc. Journ. iv. 1848, pp. 315-323.

On British fossil Lepadidæ. Geol. Soc. Journ. vi. 1850, pp. 439-440. [The G. S. J. says, "This paper was withdrawn by the author with the permission of the Council."]

Analogy of the Structure of some Volcanic Rocks with that of Glaciers. Edinb. Roy. Soc. Proc. ii. 1851, pp. 17-18.

On the power of Icebergs to make rectilinear, uniformly-directed Grooves across a Submarine Undulatory Surface. Phil. Mag. x. 1855, pp. 96-98.

Vitality of Seeds. *Gardeners' Chronicle*, Nov. 17, 1855, p. 758.

On the action of Sea-water on the Germination of Seeds. [1856.] Linn. Soc. Journ. i. 1857 (*Botany*), pp. 130-140.

On the Agency of Bees in the Fertilisation of Papilionaceous Flowers. *Gardeners' Chronicle*, p. 725, 1857.

On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection. By Charles Darwin, Esq., F.R.S., F.L.S., and F.G.S., and Alfred Wallace, Esq. [Read July 1st, 1858.] Journ. Linn. Soc. 1859, vol. iii. (*Zoology*), p. 45.

Special titles of C. Darwin's contributions to the foregoing:—

- (i) Extract from an unpublished work on Species by C. Darwin, Esq., consisting of a portion of a chapter entitled, "On the Variation of Organic Beings in a State of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species." (ii) Abstract of a Letter from C. Darwin, Esq., to Professor Asa Gray, of Boston, U. S., dated Sept. 5, 1857.

On the Agency of Bees in the Fertilisation of Papilionaceous Flowers, and on the Crossing of Kidney Beans. *Gardeners' Chronicle*, 1858, p. 828 and Ann. Nat. Hist. 3rd series ii. 1858, pp. 459-465.

Do the Tineina or other small Moths suck Flowers, and if so what Flowers? *Entom. Weekly Intell.* vol. viii. 1860, p. 103.

Note on the achenia of *Pumilio Argyrolepis*. *Gardeners' Chronicle*, Jan. 5, 1861, p. 4.

Fertilisation of Vincas. *Gardeners' Chronicle*, pp. 552, 831, 832. 1861.

On the Two Forms, or Dimorphic Condition, in the species of *Primula*, and on their remarkable Sexual Relations. Linn. Soc. Journ. vi. 1862 (*Botany*), pp. 77-96.

On the Three remarkable Sexual Forms of *Catasetum tridentatum*,

- an Orchid in the possession of the Linnean Society. Linn. Soc. Journ. vi. 1862 (*Botany*), pp. 151-157.
- Yellow Rain. *Gardeners' Chronicle*, July 18, 1863, p. 675.
- On the thickness of the Pampean formation near Buenos Ayres. Geol. Soc. Journ. xix. 1863, pp. 68-71.
- On the so-called "Auditory-sac" of Cirripedes. Nat. Hist. Review, 1863, pp. 115-116.
- A review of Mr. Bates' paper on 'Mimetic Butterflies.' Nat. Hist. Review, 1863, p. 221—. [Not signed.]
- On the existence of two forms, and on their reciprocal sexual relation, in several species of the genus *Linum*. Linn. Soc. Journ. vii. 1864 (*Botany*), pp. 69-83.
- On the Sexual Relations of the Three Forms of *Lythrum salicaria*. [1864.] Linn. Soc. Journ. viii. 1865 (*Botany*), pp. 169-196.
- On the Movement and Habits of Climbing Plants. [1865.] Linn. Soc. Journ. ix. 1867 (*Botany*), pp. 1-118.
- Note on the Common Broom (*Cytisus scoparius*). [1866.] Linn. Soc. Journ. ix. 1867 (*Botany*), p. 358.
- Notes on the Fertilization of Orchids. Ann. and Mag. Nat. Hist. 4th series, iv. 1869, pp. 141-159.
- On the Character and Hybrid-like Nature of the Offspring from the Illegitimate Unions of Dimorphic and Trimorphic Plants. [1868.] Linn. Soc. Journ. x. 1869 (*Botany*), pp. 393-437.
- On the Specific Difference between *Primula veris*, Brit. Fl. (var. *officinalis*, of Linn.), *P. vulgaris*, Brit. Fl. (var. *acaulis*, Linn.), and *P. elatior*, Jacq.; and on the Hybrid Nature of the common Oxslip. With Supplementary Remarks on naturally produced Hybrids in the genus *Verbascum*. [1868.] Linn. Soc. Journ. x. 1869 (*Botany*), pp. 437-454.
- Note on the Habits of the Pampas Woodpecker (*Colaptes campestris*). Zool. Soc. Proc. Nov. 1, 1870, pp. 705-706.
- Fertilisation of *Leschenaultia*. *Gardeners' Chronicle*, p. 1166, 1871.
- The Fertilisation of Winter-flowering Plants. 'Nature,' Nov. 18, 1869, vol. i. p. 85.
- Pangeneses. 'Nature,' April 27, 1871, vol. iii. p. 502.
- A new view of Darwinism. 'Nature,' July 6, 1871, vol. iv. p. 180.
- Bree on Darwinism. 'Nature,' Aug. 8, 1872, vol. vi. p. 279.
- Inherited Instinct. 'Nature,' Feb. 13, 1873, vol. vii. p. 281.
- Perception in the Lower Animals. 'Nature,' March 13, 1873, vol. vii. p. 360.
- Origin of certain instincts. 'Nature,' April 3, 1873, vol. vii. p. 417.

- Habits of Ants. 'Nature,' July 24, 1873, vol. viii. p. 244.
- On the Males and Complemental Males of Certain Cirripedes, and on Rudimentary Structures. 'Nature,' Sept. 25, 1873, vol. viii. p. 431.
- Recent researches on Termites and Honey-bees. 'Nature,' Feb. 19, 1874, vol. ix. p. 308.
- Fertilisation of the Fumariaceæ. 'Nature,' April 16, 1874, vol. ix. p. 460.
- Flowers of the Primrose destroyed by Birds. 'Nature,' April 23, 1874, vol. ix. p. 482; May 14, 1874, vol. x. p. 24.
- Cherry Blossoms. 'Nature,' May 11, 1876, vol. xiv. p. 28.
- Sexual Selection in relation to Monkeys. 'Nature,' Nov. 2, 1876, vol. xv. p. 18. Reprinted as a supplement to the 'Descent of Man,' 18..
- Fritz Müller on Flowers and Insects. 'Nature,' Nov. 29, 1877, vol. xvii. p. 78.
- The Scarcity of Holly Berries and Bees. *Gardeners' Chronicle*, Jan. 20, 1877, p. 83.
- Note on Fertilization of Plants. *Gardeners' Chronicle*, vol. vii. p. 246, 1877.
- A biographical sketch of an infant. 'Mind,' No. 7, July, 1877.
- Transplantation of Shells. 'Nature,' May 30, 1878, vol. xviii. p. 120.
- Fritz Müller on a Frog having Eggs on its back—on the abortion of the hairs on the legs of certain Caddis-Flies, &c. 'Nature,' March 20, 1879, vol. xix. p. 462.
- Rats and Water-Casks. 'Nature,' March 27, 1879, vol. xix. p. 481.
- Fertility of Hybrids from the common and Chinese Goose. 'Nature,' Jan. 1, 1880, vol. xxi. p. 207.
- The Sexual Colours of certain Butterflies. 'Nature,' Jan. 8, 1880, vol. xxi. p. 237.
- The Omori Shell Mounds. 'Nature,' April 15, 1880, vol. xxi. p. 561.
- Sir Wyville Thomson and Natural Selection. 'Nature,' Nov. 11, 1880, vol. xxiii. p. 32.
- Black Sheep. 'Nature,' Dec. 30, 1880, vol. xxiii. p. 193.
- Movements of Plants. 'Nature,' March 3, 1881, vol. xxiii. p. 409.
- The Movements of Leaves. 'Nature,' April 28, 1881, vol. xxiii. p. 603.
- Inheritance. 'Nature,' July 21, 1881, vol. xxiv. p. 257.
- Leaves injured at Night by Free Radiation. 'Nature,' Sept. 15, 1881, vol. xxiv. p. 459.
- The Parasitic Habits of *Molothrus*. 'Nature,' Nov. 17, 1881, vol. xxv. p. 51.

- On the Dispersal of Freshwater Bivalves. 'Nature,' April 6, 1882, vol. xxv. p. 529.
- The Action of Carbonate of Ammonia on the Roots of certain Plants. [Read March 16, 1882.] Linn. Soc. Journ. (*Botany*), vol. xix. 1882, pp. 239-261.
- The Action of Carbonate of Ammonia on Chlorophyll-bodies. [Read March 6, 1882.] Linn. Soc. Journ. (*Botany*), vol. xix. 1882, pp. 262-284.
- On the modification of a Race of Syrian Street-Dogs by means of Sexual Selection. By W. Van Dyck. With a preliminary notice by Charles Darwin. [Read April 18, 1882.] Proc. Zoolog. Soc. 1882, pp. 367-370.

APPENDIX III.

PORTRAITS.

Date.	Description.	Artist.	In the Possession of
1838	Water-colour .	G. Richmond	The Family.
1851	Lithograph . .	Ipswich British Assn. Series.	
1853	Chalk Drawing .	Samuel Lawrence	The Family.
1853?	Chalk Drawing*	Samuel Lawrence	Prof. Hughes, Cam- bridge.
1869	Bust, marble .	T. Woolner, R. A.	The Family.
1875	Oil Painting† .	W. Oules, R. A.	The Family.
	Etched by	P. Rajon.	
1879	Oil Painting .	W. B. Richmond.	The University of Cambridge.
1881	Oil Painting‡ .	Hon. John Collier	The Linnæan So- ciety.
	Etched by	Leopold Flameng	

CHIEF PORTRAITS AND MEMORIALS NOT TAKEN FROM LIFE.

Statue	Joseph Boehm, R. A.	Museum, South Ken- sington.
Bust	Chr. Lehr, Junr.	
Plaque	T. Woolner, R. A., and Josiah Wedg- wood and Sons.	Christ's College, in Charles Darwin's Room.
Deep Medallion .	J. Boehm, R. A.	To be placed in West- minster Abbey.

* Probably a sketch made at one of the sittings for the last-mentioned.

† A *replica* by the artist is in the possession of Christ's College, Cam-
bridge.

‡ A *replica* by the artist is in the possession of W. E. Darwin, Esq.,
Southampton.

CHIEF ENGRAVINGS FROM PHOTOGRAPHS.

- * 1854? By Messrs. Maull and Fox, engraved on wood for 'Harper's Magazine' (Oct. 1884).
 - * 1870? By O. J. Rejlander, engraved on steel by C. H. Jeens for 'Nature' (June 4, 1874).
 - * 1874? By Capt. Darwin, R. E., engraved on wood for the 'Century Magazine' (Jan. 1883). Frontispiece, vol. i.
 - 1881 By Messrs. Elliott and Fry, engraved on wood by G. Kruells, for vol. ii. of the present work.
-

* The dates of these photographs must, from various causes, remain uncertain. Owing to a loss of books by fire, Messrs. Maull and Fox can give only an approximate date. Mr. Rejlander died some years ago, and his business was broken up. My brother, Captain Darwin, has no record of the date at which his photograph was taken.

APPENDIX IV.*

HONOURS, DEGREES, SOCIETIES, &c.

Order.—Prussian Order, ‘Pour le Mérite.’ 1867.

Office.—County Magistrate. 1857.

Degrees.—Cambridge { B.A. 1831 [1832].†
M.A. 1837.
Hon. LL.D. 1877.

Breslau . Hon. Doctor in Medicine and Surgery. 1862.

Bonn . Hon. Doctor in Medicine and Surgery. 1868.

Leyden . Hon. M.D. 1875.

Societies.—London . Zoological. Corresp. Member. 1831.†
Entomological. 1833, Orig. Member.
Geological. 1836. Wollaston Medal, 1859.
Royal Geographical. 1838.
Royal. 1839. Royal Medal, 1853. Copley Medal, 1864.
Linnean. 1854.
Ethnological. 1861.
Medico-Chirurgical. Hon. Member. 1868.
Baly Medal of the Royal College of Physicians, 1879.

* The list has been compiled from the diplomas and letters in my father's possession, and is no doubt incomplete, as he seems to have lost or mislaid some of the papers received from foreign Societies. Where the name of a foreign Society (excluding those in the United States) is given in English, it is a translation of the Latin (or in one case Russian) of the original Diploma.

† See vol. i. p. 139.

‡ He afterwards became a Fellow of the Society.

Societies.—PROVINCIAL, COLONIAL AND INDIAN.

- Royal Society of Edinburgh, 1865.
 Royal Medical Society of Edinburgh, 1826. Hon. Member, 1861.
 Royal Irish Academy. Hon. Member, 1866.
 Literary and Philosophical Society of Manchester. Hon. Member, 1868.
 Watford Nat. Hist. Society. Hon. Member, 1877.
 Asiatic Society of Bengal. Hon. Member, 1871.
 Royal Society of New South Wales. Hon. Member, 1879.
 Philosophical Institute of Canterbury, New Zealand. Hon. Member, 1863.
 New Zealand Institute. Hon. Member, 1872.

Foreign Societies.

AMERICA.

- Sociedad Científica Argentina. Hon. Member 1877.
 Academia Nacional de Ciencias, Argentine Republic. Hon. Member, 1878.
 Sociedad Zoológica Argentina. Hon. Member, 1874.
 Boston Society of Natural History. Hon. Member, 1873.
 American Academy of Arts and Sciences (Boston). Foreign Hon. Member, 1874.
 California Academy of Sciences. Hon. Member, 1872.
 California State Geological Society. Corresp. Member, 1877.
 Franklin Literary Society, Indiana. Hon. Member, 1878.
 Sociedad de Naturalistas Neo-Granadinos. Hon. Member, 1860.
 New York Academy of Sciences. Hon. Member, 1879.
 Gabinete Portuguez de Leitura em Pernambuco. Corresp. Member, 1879.
 Academy of Natural Sciences of Philadelphia. Correspondent, 1860.
 American Philosophical Society, Philadelphia. Member, 1869.

AUSTRIA-HUNGARY.

- Imperial Academy of Sciences of Vienna. Foreign Corresponding Member, 1871; Hon. Foreign Member, 1875.
 Anthropologische Gesellschaft in Wien. Hon. Member, 1872.
 K. k. Zoologisch-botanische Gesellschaft in Wien. Member, 1867.
 Magyar Tudományos Akadémia, Pest, 1872.

BELGIUM.

Société Royale des Sciences Médicales et Naturelles de Bruxelles.

Hon. Member, 1878.

Société Royale de Botanique de Belgique. 'Membre Associé,' 1881.

Académie Royale des Sciences, &c., de Belgique. 'Associé de la Classe des Sciences.' 1870.

DENMARK.

Royal Society of Copenhagen. Fellow, 1879.

FRANCE.

Société d'Anthropologie de Paris. Foreign Member, 1871.

Société Entomologique de France. Hon. Member, 1874.

Société Géologique de France (Life Member), 1837.

Institut de France. 'Correspondant' Section of Botany, 1878.

GERMANY.

Royal Prussian Academy of Sciences (Berlin). Corresponding Member, 1863; Fellow, 1878.

Berliner Gesellschaft für Anthropologie, &c. Corresponding Member, 1877.

Schlesische Gesellschaft für Vaterländische Cultur (Breslau). Hon. Member, 1878.

Cæsarea Leopoldino-Carolina Academia Naturæ Curiosorum (Dresden).^{*} 1857.

Senkenbergische Naturforschende Gesellschaft zu Frankfurt am Main. Corresponding Member, 1873.

Naturforschende Gesellschaft zu Halle. Member 1879.

Siebenbürgische Verein für Naturwissenschaften (Hermannstadt). Hon. Member, 1877.

Medicinisch - naturwissenschaftliche Gesellschaft zu Jena. Hon. Member, 1878.

^{*} The diploma contains the words "accipe . . . ex antiqua nostra consuetudine cognomen Forster." It was formerly the custom in the *Cæsarea Leopoldino-Carolina Academia*, that each new member should receive as a 'cognomen,' a name celebrated in that branch of science to which he belonged. Thus a physician might be christened Boerhave, or an astronomer, Kepler. My father seems to have been named after the traveler John Reinhold Forster.

Royal Bavarian Academy of Literature and Science (Munich).
Foreign Member, 1878.

HOLLAND.

Koninklijke Natuurkundige Vereeniging in Nederlandsch - Indie
(Batavia). Corresponding Member, 1880.

Société Hollandaise des Sciences à Harlem. Foreign Member, 1877.
Zeeuwsch Genootschap der Wetenschappen te Middleburg. Foreign
Member, 1877.

ITALY.

Società Geografica Italiana (Florence). 1870.

Società Italiana di Antropologia e di Etnologia (Florence). Hon.
Member, 1872.

Società dei Naturalisti in Modena. Hon. Member, 1875.

Accademia de' Lincei di Roma. Foreign Member, 1875.

La Scuola Italica, Accademia Pitagorica, Reale ed Imp. Società
(Rome). "Presidente Onoraria degli Anziani Pitagorici," 1880.

Royal Academy of Turin. 1873. *Bressa* Prize, 1879.

PORTUGAL.

Sociedade de Geographia de Lisboa (Lisbon). Corresponding Mem-
ber, 1877.

RUSSIA.

Society of Naturalists of the Imperial Kazan University. Hon.
Member, 1875.

Societas Cæsarea Naturæ Curiosorum (Moscow). Hon. Member,
1870.

Imperial Academy of Sciences (St. Petersburg). Corresponding
Member, 1867.

SPAIN.

Institucion Libre de Enseñanza (Madrid). Hon. Professor, 1877.

SWEDEN.

Royal Swedish Acad. of Sciences (Stockholm). Foreign Member,
1865.

Royal Society of Sciences (Upsala). Fellow, 1860.

SWITZERLAND.

Société des Sciences Naturelles de Neuchatel. Corresponding
Member, 1863.

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